

**THE IMPACT OF EXTERNAL SHOCKS ON NIGERIA'S GDP PERFORMANCE
WITHIN THE CONTEXT OF THE GLOBAL FINANCIAL CRISIS**

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ABSTRACT

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The Impact of External Shocks on Nigeria's GDP Performance within the Context of the Global Financial Crisis

Keywords: External Shocks, Global Financial Crisis, Business Cycles, Vector Autoregression, Impulse Response Function, Innovations, Variance Decomposition Function, Vector Error Correction, Nigeria

This research examines the impact of external shocks on Nigeria's output performance for the period 1981 – 2015. It aims to bring to the fore the importance of considering external shocks during policy design and implementation. The multivariate VAR and VECM frameworks were used to evaluate the impact of the shock variables on Nigeria's output performance and to achieve the stated objectives. Findings show that the external shock and domestic policy variables have short-run effects on Nigeria's output performance. Also, all the measures of external shocks and domestic policies display some viable information in explaining the variabilities in Nigeria's output performance over the horizon. The comparison between the results of the VECM and the unrestricted VAR shows that the unrestricted VAR model outperformed the VECM.

The overall result of the study confirms the view about the vulnerability of the Nigerian economy to external shocks. These shocks explain more than half of the variance in real output performance and have varying effects on output performance in Nigeria. The dynamic response of output performance to each of the defined shock variables show that output performance responds rapidly to the shock variables, while its response to the domestic economic variables is seemingly moderate. Finally, the variance decomposition show that international crude oil price and terms of trade have the largest share in accounting for the variability in output performance, followed closely by the shares of capital inflows and monetary policy.

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DEDICATION

This thesis is dedicated to a faithful God, who is ever loving and ever true for seeing me through this part of my life's journey. I also dedicate this thesis to my parents: late Isaac Tom Akpan and Ima Isaac Akpan for teaching me to persevere, as well as my loving and supportive wife, Blessing Nkereuwem Akpan for her encouragement and standing by me all through this journey. I cannot but dedicate this thesis to my wonderful children: Ubongabasi, Utibeabasi and Edidiong for their patience and understanding.

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ABBREVIATION

ABS – Asset-Backed Securities
ACGS – Agricultural Credit Guarantee Scheme
ACSS – Agricultural Credit Support Scheme
ADF – Augmented Dickey-Fuller
ADL – Auto-regressive Distributed Lag
AIC – Akaike Information Criterion
AMCON – Asset Management Corporation of Nigeria
ASI – All-Share Index
ATA – Agricultural Transformation Agenda
ATM – Automated Teller Machine
BDCs – Bureau De Change
BOFIA – Bank and Other Financial Institutions Act
BOI – Bank of Industry
BOP – Balance of Payments
CACS – Commercial Agriculture Credit Scheme
CADP – Commercial Agriculture Development Programme
CBN – Central Bank of Nigeria
CDMA – Code Division Multiple Access
CDO – Collateralized Debt Obligations
CDS – Credit Default Swaps
COB – Currency Outside Bank
CRR – Cash Reserve Ratio
DF-GLS – Detrended Dickey-Fuller
DFIs – Development Finance Institutions
DHs – Discount Houses
DMBs – Deposit Money Banks
e-FASS – Electronic Financial Analysis and Surveillance System
ECM – Error Correction Models
ECT – Error Correction Term
EDW – Expanded Discount Window

EFS – Economic Support Funds
EIA – Energy Information Administration
EU – European Union
FAAC – Federation Account Allocation Committee
FCs – Finance Companies
FCT – Federal Capital Territory
FDI – Foreign Direct Investment
FEVD – Forecast Error Variance Decomposition
FGN – Federal Government of Nigeria
FIH – Financial Instability Hypothesis
FPE – Final Prediction Error
FSRCC – Financial Services Regulation Coordinating Committee
GDP – Gross Domestic Product
GDR – Global Depository Receipts
GIRF – Generalized Impulse Response Function
GMM – Generalized Methods of Moment
GSM – Global Systems for Mobile Communications
GVAR – Generalized Vector Autoregressive
HIPCs – Heavily Indebted Countries
HQ – Hannan-Quinn Information Criterion
ICT – Information and Communications Technology
IDB – Interest Draw Back
IFRS – International Financial Reporting Standards
IIP – International Investment Position
IMF – International Monetary Fund
IMF-IFS – International Monetary Fund – International Financial Statistics
IRF – Impulse Response Function
ISPs Internet Service Providers
LAC – Latin America Countries
LDCs – Less Developed Countries
LGAs – Local Government Areas

LICs – Low-Income Countries
LNG – Liquefied Natural Gas
LR – Liquidity Ratio
LR – Sequential Modified LR
M2 – Money Supply (Broad Money)
MB – Million Barrels
MBD – Million Barrels per day
MDAs – Ministries, Departments and Agencies
MDGs – Millennium Development Goals
MFBs – Microfinance Banks
MoUs – Memorandum of Understandings
MPR – Monetary Policy Rate
MRR – Minimum Rediscount Rate
MSEs – Medium Scale Enterprises
NAICOM – National Insurance Commission
NBS – National Bureau of Statistics
NCC – Nigerian Communications Commission
NDIC – Nigerian Deposit Insurance Corporation
NIRSAL – Nigeria Incentive-based Risk Sharing System for Agricultural Lending
NOP – Net Open Position
NPL – Non-Performing Loan
NSE – Nigeria Stock Exchange
ODA – Official Development Assistance
OECD-DAC – Organization for Economic Co-operation and Development's
Development Assistance Committee
OLS – Ordinary Least Squares
OPEC – Organization of the Petroleum Exporting Countries
PMIs – Primary Mortgage Institutions
POS – Point of Sales
PP – Phillip Peron
PPP – Purchasing Power Parity

PPT – Petroleum Profit Tax
RBC – Real Business Cycle
RDAS – Retail Dutch Auction System
SAP – Structural Adjustment Programme
SEC – Securities and Exchange Commission
SIC – Schwarz Information Criterion
SMEs – Small and Medium Enterprises
SSA – Social Structure of Accumulation
SSA – Sub-Saharan Africa
SSAs – State Statistical Agencies
SSEs – Small Scale Enterprises
SVAR – Structural Vector Autoregressive
TFM – Trust Fund Model
TFP – Total Factor Productivity
VAR – Vector Autoregression
VAT – Value Added Tax
VDC – Variance Decomposition
VECM – Vector Error Correction Model
WDAS – Whole Sale Dutch Auction System
WB-WDI – World Bank – World Development Index
REER – Real Effective Exchange Rate

Chapter One

Introduction

1.1 Background to the Study

Over the last two decades, the importance of external factors in the performance of major economic fundamentals in developing and emerging market economies have been the focus of many studies on economic performance. Over time, experts have pointed to sound and robust macroeconomic policies, driven by sound macroeconomic fundamentals to trigger good economic performance. This was the understanding of the factors assumed to be responsible for the emergence of the Asian Tigers and the rapid growth of emerging market countries in Asia, Latin America and Africa (Cubeddu et al., 2014). Also, this has been the case up until the 1990's when many experts and policymakers alike, believed that strong fundamentals are the driving force for output growth. This presupposition could not be easily disputed unless there was a way to effectively separate the effect of sound macroeconomic policies on growth performance in the absence or presence of significant influence of external factors.

In the early 1990's Calvo et al. (1993) who were looking at the role of external factors in explaining the behavior of capital inflows and real exchange rate appreciation in Latin America highlighted the fact that the explanation for the renewed surge of capital inflows to the region could not be attributed to domestic reforms alone. They noted that though most countries in the region were engaging in a substantial reform process, there was a surge in capital inflows, despite the wide divergence across countries in the region regarding macroeconomic policies and economic performance. They attributed this seemingly good performance to external factors, which was a common shock to the whole region, as playing a large role. Furthermore, they alluded to the fact that this period of good performance coincided with the period of falling interest rates, continuing recession and unfavourable balance of payments developments in the U.S., which led investors to seek better investment opportunities abroad. A situation Calvo et al.

(1993) expressed as a case of a financial shock in the centre affecting the periphery. They concluded in their study that external factors accounted for about 50.0% of the behaviour of both capital inflows to and real exchange rate in the region in the early 1990's. Also, they noted that these external factors could deteriorate economic performance in the region just as easily as they had improved it, with severe consequences.

External factors or external shocks are unexpected or unpredictable events that affect an economy, either positively or negatively. Technically, it refers to an unpredictable change in exogenous factors, that is, factors that may influence endogenous economic variables. They are unexpected changes in economic variables which take place outside the economy and produce significant change within the economy (Bodenstein et al., 2011; Galesi and Lombardi, 2013). According to Duttagupta et al. (2014), the global financial crisis is a perfect illustration of the impact of external shocks on an economy. According to the authors, external factors played a prominent role in the growth performance of most emerging market economies during the global financial crisis. They note that external factors induced significant fluctuations in emerging market economies' growth, therefore explaining about half the variance in their growth rates during the period. Some authors are of the opinion that the slowdown in the emerging market economies during the period was exacerbated by external factors, that is, the external environment characterised by high commodity prices and cheap external credit (Eichengreen et al., 2011; Aslund, 2013). However, it is worthy to note that the impact of external shocks on a particular economy depends on how exposed the economy is to these shocks via cross-border linkages and on how domestic policy stabilisers are allowed to work. Over time, the cumulative effect on domestic growth could be amplified or dampened depending on how domestic policies respond to these external shocks (Duttagupta et al., 2014).

Still stressing on the importance of external shocks, Izquierdo et al. (2008) was inspired by the works of Calvo et al. (1993) to further investigate the importance of

external shocks in the Latin America economies. They asserted that in assessing the effectiveness of macroeconomic policies in Latin America's business cycle fluctuations, external factors should be given serious considerations to avoid misjudgment of the efficacy of policies or the misinterpretation of outcomes from policy prescriptions. Izquierdo et al. (2008) modelled the relationship between seven (7) Latin America countries GDP (LAC7 GDP) and several external factors. They found that the external factors considered accounted for a huge proportion of the variation in the LAC7 GDP growth. Furthermore, they opined that external factors were responsible for a substantial share of the LAC7 growth performance. They concluded by drawing the attention of policymakers and analyst alike to the need to distil out the effects of external factors on growth performance, to be able to appropriately evaluate the efficacy of domestic macro and micro policies on growth, as well as the strength or weakness of macroeconomic fundamentals.

According to literature, external shocks produce significant impacts within an economy, as these shocks are unpredictable. They come in various forms, such as technological, oil price, fiscal, monetary, terms of trade, investment, exchange rate, interest rate, capital flows (sudden stops), currency devaluation shocks, etc. Several studies such as: Calvo et al. (1993), Mendoza (1995), Rattsø and Torvik (1998), Broda and Tille (2003), Izquierdo et al. (2008), Marion et al. (2009), Aarle and Sosoian (2010), Calomiris et al. (2010), Krznar and Kunovac (2010), Alege et al. (2012), Cabezón (2012), Asghar et al. (2013), Saibu and Apanisile (2013), etc, have attempted to bring to the fore, the relationship between external shocks and various macroeconomic indicators, but their findings remain mixed with divergence of views on the issue. In most studies, terms of trade shock have been alluded to as one of the most frequent and widely used measures of external shocks (Marion et al., 2009). This is because the degree of openness of an economy determines the extent (severe or mild) of the impact of external shocks on the economy (Rattsø and Torvik, 1998). A great deal of studies have been conducted to assess the impact of terms of trade shocks on growth using various quantitative techniques and multi-sector equilibrium models (Mendoza, 1995;

Easterly et al., 2001; Kose and Riezman, 2001; Rodrik, 2001; Kose, 2002; Calderon et al., 2005). Ramey and Ramey (1995), and Martin and Rogers (2000) noted that volatility in major macroeconomic variables had been shown to affect economic growth negatively. The same can be said of the terms of trade, as the gains from trade can easily be eroded if it significantly exposes the economy to external shocks.

The contagion effect of crisis from one country to the other has been made evident in recent past. In the context of global integration, Corsetti et al. (1999) and Kaminsky et al. (2003) noted that emerging markets have increased in significance in the last two decades due to their high degree of openness. They emphasised the role of regional contagion in the Asian crisis in 1997-1998 and that the macroeconomic fluctuations during the period have been explained by their high degree of openness, as well as by their interdependence. Stock market integration has been another veritable source through which shocks are transmitted into the economy. Investors tend to diversify their investments through the stock market because they can increase returns or reduce risk or both on their investment portfolio through the stock market. Kassim (2012) noted that the degree of stock markets integration is a pointer to financial sector integration, and this shows how vulnerable a country is to financial contagion. The author further noted that negative developments in the financial sector are transmitted amongst countries through systemic shocks because these countries are integrated through strong economic (such as trade, finance and investment) and macroeconomic policy harmonisation. Ibrahim (2000) also made the same assertion when he showed that international financial instabilities are easily transmitted to domestic financial markets because of increasing integration among national stock markets. Hence, its implications for the potential benefits of the international portfolio diversification and financial stability of a country.

The implications of this interdependence of the world economies and global integration have been demonstrated in the recent 2007/2008 global financial crisis,

which originated from the sub-prime mortgage bubble and exceptionally loose monetary policy in the U.S.. This crisis which started as a burst in the U.S. housing market bubble escalated into the most severe global recession since the Great Depression of the 1930s. It has raised the anxieties of governments and policymakers of the vulnerability of the world economies to external shocks. It opened the eyes of the world to a whole new dimension of the economic and financial crisis (Nguyen et al., 2014). The global financial crisis greatly slowed down growth to about 1.0% from an annual average of over 6.0% (IMF 2009 estimates) in Africa, thrust many into poverty and eroded the progress achieved in the attainment of the Millennium Development Goals (MDGs) (Arieff et al., 2010). For most low-income countries, the shock from the crisis affected food prices and wage rates for unskilled workers, impacting severely on poverty (Lin and Martin, 2010). To demonstrate the extent and severity of the crisis, in 2009, the United States 111th Congress provided \$255.6 million Economic Support Funds (ESF) in the Supplemental Appropriations Act, 2009 (P.L. 111-32), for the assistance of vulnerable populations in developing countries affected by the crisis (Arieff et al., 2010). As a result of the crisis, some African countries were to benefit from the funds appropriated in the supplemental. In 2010, Ghana got \$32.5 million obligated for various programs, Liberia - \$25.2 million, Tanzania - \$37.9 million, and \$25 million for Zambia (Arieff et al., 2010; Alege et al., 2012).

Nigeria is an emerging economy that is integrated globally with the rest of the world. It is expected that external conditions in the world will strongly influence economic developments in the country, especially through international crude oil price (given that the country is an oil-dependent economy), as well as trade and financial links. Globalisation has made it such that countries of the world are very much dependent on one another in many ways. Global integration through increased trade, financial transactions, foreign investments, global financial institutions and even through macroeconomic policies has made world economies vulnerable to spillover effects from other economies and subject to a variety of external shocks. Several studies as reviewed in this research has shown that these

shocks which are propagated through various channels, affect economies differently (depending on whether they are developed, developing, emerging or underdeveloped) and the countries also respond through different adjustment mechanisms (Sosa and Cashin, 2013).

At the onset of the global financial crisis, Nigeria was thought to be immune to the shock generated by the crisis. Policymakers were unaware of the extent of the country's global integration with the world economies (especially through trade, financial integration, balance of payments transactions, etc.) and the degree of exposure to external shocks. The effect of the crisis was transmitted into the economy through various forms of shocks. Akperan (2009) noted that the impact of the shocks started manifesting in Nigeria by August 2008, but became more pronounced by December of 2008. There was a rapid fall in crude oil price to about \$50 in January 2009 from \$147 as at July 2008, with severe consequences for government revenue and expenditure (Alege et al., 2012). Several studies have attempted to assess the impact of the crisis on the Nigerian economy from various perspectives: Adamu (2009); Ajakaiye and Fakiyesi (2009); Ajao and Festus (2011); Igbatayo (2011); Olowe (2011); Ujunwa et al. (2011); Ashamu and Abiola (2012); Fapohunda (2012); Nkoro and Uko (2012); Olokoyo and Ogunnaike (2012); Wodi (2012); Yakubu and Akerele (2012); Asaju et al. (2013); Mohammed and Mohammed (2013); Saibu and Apanisile (2013); Ngwube and Ogbuagu (2014); and Luqman (2015). The results from all these studies have been mixed and in many folds, depending on several factors such as available data, methodology, context, macroeconomic variables used, perception, etc.

Nigeria is a member of the Organization of the Petroleum Exporting Countries (OPEC) and the 6th largest oil-producing country. The discovery of oil in commercial quantity in 1956 in Oloibiri, Niger Delta region of Nigeria and the oil boom of the 1970s turned around the country's fortunes. The share of oil revenue in government revenue went from 26.0% in 1970 to 82.0% in 1974, and the share of oil export in total export went from 58.0% to 93.0% in the same period (Ayadi et

al., 2000). Most of the country's crude oil sell on international markets. As at the end of 2014, the country produces about 708.10 million barrels (mb) (averaging about 1.94 million barrels per day (mbd)); foreign exchange earnings from oil exports constitute over 24.7% of the country's foreign exchange earnings; while gross oil revenue stood at about 7.6% of GDP, representing 67.5% of the total federally-collected revenue (CBN, 2014). Due to the contribution of the oil sector to the Nigerian economy, it is seen as the single most important sector of the economy and a veritable source of shock to the economy.

The economic performance of Nigeria is not only predicated on domestic policies, but also on external factors (such as global policies, global economic fundamentals, and world commodity prices) that emanate from the rest of the world's economies and global institutions. Considering the importance of international crude oil prices, trade (import and export), financial account transactions, capital flows and other external economic variables in the country's economic fortune, and the fact that these variables are volatile and unpredictable, the country's economic performance mimics the developments in the behaviour of these variables. For instance, a shock to the international oil market (in the form of production cut or increase) will affect the price of crude oil, thereby impacting the country's ability to finance its budgetary expenditure and the central bank's ability to supply foreign exchange to the foreign exchange market through the oil revenue or foreign exchange earnings. This will, therefore, trigger speculation and undermine the government's ability to service its commitment, thus creating a whole spiral of events.

The need to adequately measure the effect of these shocks and properly account for their impacts has raised several interesting empirical questions as to what is the implication of these external shocks for important macroeconomic fundamentals? Which of these external shocks account for a larger proportion of real output fluctuations? How do important macroeconomic variables respond to these shocks? And what is the role of external shocks in economic fluctuation? These

questions pave the way for the need for the correct identification and evaluation of the sources of, impacts of and adjustment mechanisms to these external disturbances. This exercise is important for the better understanding of economic fluctuations and to inform the design and implementation of macroeconomic policies in the countries of the world. It is also important to know how to make the domestic economy resilient to and insulated from these shocks (Sosa and Cashin, 2013).

With regards to Nigeria, several studies have attempted to assess the impact of external shocks on the economy. These studies have examined the impacts of oil price shocks, oil production shocks, shocks from international trade (focusing on exports), unrest in the international oil market, foreign direct investment (FDI) shocks etc., on the Nigerian economy. Others have attempted to examine the effectiveness of fiscal and monetary policies in mitigating external shocks on the Nigerian economy: Ayadi et al. (2000); Ajakaiye and Fakiyesi (2009); Aliyu (2009); Adeniyi et al. (2011); Alimi and Atanda (2011); Amba (2011); Alege et al. (2012); Iklaga and Evbuomwan (2012); Omojolaibi (2013); Saibu and Apanisile (2013); Arodoye and Iyoha (2014); Audu et al. (2015); Yusuf (2015); and Ekesiobi et al. (2016). All these studies found that the external shocks under investigation either have a positive or a negative impact on the variable of interest, depending on the methodology employed or data set used.

A critical assessment of past and current studies on the impact of external shocks on the Nigerian economy show that most of these studies did not evaluate the impact of the referenced shock variable based on whether it was direct or indirect. In the case of most less developed countries (LDCs) and emerging market economies, it was not so much the direct impact but the indirect effects that were important. For example, a fall in crude oil price during the period of the global financial crisis was linked to the fall in demand for crude oil as a result of the slowdown in economic activities in most advanced economies. Secondly, most of the studies concentrated only on the impact of a single shock variable at a time or

most two. Thirdly, majority of these studies concentrated majorly on the impact of oil price shocks on the Nigerian economy, given the high dependency of the economy on crude oil. Finally, some of the methodologies used in most of the studies could not adequately capture the impact of the shock on the variable of interest.

These gaps make it difficult to generalise the impact of these shocks throughout the whole phases that the economy has gone through and to properly situate the impact of these shocks at various points in time in the economic journey of the country. Furthermore, most of these studies did not effectively and specifically address the importance of considering these shocks during policy design and implementation. Thus, given the gaps in the previous studies, this thesis aims to extend the frontier of existing literature by analysing how Nigeria's output responds to external shocks within the context of the global financial crisis. Also, the study shall attempt to investigate the magnitude of influence of external shocks on Nigeria's output performance. Therefore, the framework of analysis will emphasise the relevance of incorporating external factors into policy evaluation in Nigeria, while considering the significance of these factors to the country's economic well-being.

1.2 Significance of the Study

In the last two decades, emerging and developing economies have become more integrated with developed economies and amongst themselves, both in real and financial terms. This global integration and widespread financial liberalisation have resulted in huge capital flows and increasing integration through trade and other economic activities. Consequently, this global integration and financial liberalisation have led to co-movements in most of the economic variables (inflation, unemployment, interest rates, exchange rates, output growth, etc.) for these global economies. The "contagion effect can best explain the transmission channel for these co-movements". The recent global financial crisis, which originated from the sub-prime mortgage bubble and exceptionally loose monetary policy in the U.S. is

a typical example of this contagion effect. This crisis raised the anxiety of the government and policy makers of the vulnerability of the Nigerian economy to external shocks.

The effect of this financial crisis, driven by the external shock factors spread to virtually all the sectors of the Nigerian economy, causing credit and liquidity crunch, fall in aggregate demand, increased unemployment (through Job losses), stock market collapse, fall in output and decline in revenue and a host of other macroeconomic fluctuations. It is in the face of all these issues that this thesis will bring to the fore for policymakers and the government, the importance of taking into consideration external factors in the formulation and implementation of macroeconomic policies in Nigeria. This is because accounting for these external shock factors is very important in assessing the country's growth performance, the vibrancy of its economic fundamentals and the impact of economic and political reforms on growth.

The correct identification and assessment of the sources and impacts of these external shocks are important not only to understand the country's macroeconomic performance better but also to inform the design and conduct of monetary and fiscal policies in Nigeria. Furthermore, coming up with suitable policy responses to and deciding on how to insulate the economy from these shocks effectively, depends on the proper understanding of how these shocks affect the domestic economy. It is also of importance for policymakers to know what measures or actions that can be taken to increase the resilience of the economy to external shocks. This is because, Nigeria is faced with several economic problems that are linked to the poor coordination of monetary and fiscal policies, as well as her increased exposure to global trade and finance. These problems have motivated this thesis to answer some questions, such as: To what extent does external shock impact output performance in Nigeria? And which of these shock variables have a greater impact on the variable of interest (output)? The external shock variables to be investigated in this study are international crude oil price, U.S. Treasury bond

rate, capital inflows, terms of trade, the global financial crisis (dummy), as well as domestic macroeconomic policy (fiscal and monetary policy) shocks.

1.3 Objectives and Research Questions

The broad objectives of this thesis are to examine the impact of external shocks on Nigeria's output performance and to answer the question as to which of these shock variables have the greater impact on Nigeria's output. Also, the empirical framework of the study will analyse the relevance of incorporating external factors into policy evaluation in Nigeria considering that the country is increasingly becoming more integrated globally. To this end, this thesis utilised annual secondary data from reputable databases on Nigeria during the period 1981-2015. The goal here is to have a robust set of data that will enhance our understanding and analysis of the issues surrounding the evaluation of the impact of external shocks. Also, to examine the policy implications (draw policy prescriptions) and contribute to the existing body of knowledge. The thesis specifically:

- Review definitional and conceptual issues on the financial crisis, causes and classification of the financial crisis, as well as take a peek into the recent 2007/2008 global financial crisis. Review theoretical models that best capture the recent global financial crisis and how external shocks are transmitted into the economy, as well as assess methodologies used in previous impact studies.
- Investigate empirically, the impact of external shocks on Nigeria's output performance.
- Emphasise the relevance of incorporating external factors into policy evaluation in Nigeria.
- Extend the frontier of existing literature by analysing how Nigeria's output responds to external shocks.
- Identify research gaps for future research.

Consequently, this research will, therefore, attempt to answer the following questions:

- What is the impact of external factors on Nigeria's output performance?
- What is the dynamic response of output to each of the shock variables?
- Which of these shock variables have a greater effect on Nigeria's output performance?

1.4 Contribution of the Thesis

This thesis is a pioneering work in Nigeria, being the first thesis to assess the impact of the U.S. Treasury bond and a host of external shock variables on Nigeria's output performance. The U.S. Treasury securities are widely regarded to be a safe investment because they lack significant default risk. Therefore, it is no surprise that investors turn to U.S. Treasuries during times of increased uncertainty as a haven for their investments. This happened during the recent global financial crisis such that the increase in the demand for Treasuries was sufficiently large that prices rose with an increase in the supply of government securities. This later drove down the yield on the securities (Noeth and Sengupta, 2010).

As noted by Bernanke et al. (2011), this global saving glut in the international capital markets during this period contributed to the crisis. The emerging market economies at the centre of the global saving glut (China, other Asian developing economies, and the oil exporters) for the most part restricted their U.S. purchases to Treasuries and other low-risk investments. Bertaut et al. (2012) note that the massive capital inflows pushed down yields on both short-term and long-term government securities. This was because the uncertainty in the mortgage market made investors to switch from other debt instruments, such as mortgage-backed securities, into government securities. Noeth and Sengupta (2010) pointed out that, as the crisis continued to manifest, investors increased their demand for safer assets, namely U.S. Treasuries, and this led to a further decline in the yields on U.S. Treasuries. Yields on short-term U.S. securities decreased sharply to near zero in November 2008. However, the movement in long-term Treasury yields was sluggish - hovering about 4.0% before falling to about 2.0% in December 2008. In part, this later decline was also prompted by the Federal Reserve's measures to

buy long-term Treasuries under its large-scale asset purchase programs (Noeth and Sengupta, 2010). Consequently, this carries far-reaching implications for policymakers, central bankers, debt managers, and how the demand and supply sides of government bond markets can affect economies.

The use of these variables in the VAR framework to determine their impact and influence on Nigeria's output performance contributes to the large and diverse literature for the Nigerian case. Specifically;

- This thesis, unlike other studies in Nigeria which concentrated on a single shock factor, pulls together the effect of several shock factors in a single study, thus making the study unique.
- This thesis contributes to the body of literature by examining the case of Nigeria. To my knowledge, this is the first study that tries to measure the relative importance of various external shocks in explaining Nigeria's output fluctuations in a unified framework, and to determine the dynamic responses of Nigeria's output (GDP) to each of them. Whereas, most past studies only focused on individual external shock factors.
- This thesis also attempts to evaluate the influence of external factors on output performance in an oil-dependent economy.
- This thesis will help to redirect the thoughts of policymakers in the design and conduct of macroeconomic policy in Nigeria. It will prompt them to formulate appropriate policy responses to external shocks and decide whether or not to insulate the economy from these shocks.
- Furthermore, this thesis will attempt to evaluate the performance of the two methodological approaches used; the vector autoregressive model (VAR) and vector error correction model (VECM), to see which one outperforms the other.

1.5 Data and Methodology

In Nigeria, even though the National Bureau of Statistics (NBS) is the statutory custodian of data in the country, such other sources as the Central Bank of Nigeria (CBN) (Statistical Bulletin and Annual Reports) and other ministries and government agencies still serve as veritable sources of data. Other sources of data that would be considered in this research are: the International Monetary Fund (IMF) – International Financial Statistics (IFS), the World Bank World Development Index (WB-WDI) Report, and the Energy Information Administration (EIA) of the U.S. Department of Energy. However, this research would use data sourced mainly from the Central Bank of Nigeria (CBN) and the International Monetary Fund (IMF) – International Financial Statistics (IFS) for consistency. The study recognises the importance of using a robust data set in an analysis of this nature and will endeavour to use data from 1981 to 2015 in the estimation. The choice of this period coincides with the period for which new and robust data is available after the rebasing of the country's gross domestic product (GDP) in 2014 to as far back as 1981. Also, informing the choice of the review period is the instability in most macroeconomic indicators, the unprecedented rise in oil price to the highest peak in decades and the subsequent crashing of the market owing to the global financial and economic crises. It was during this crisis period that the government and policymakers were alerted on the extent of the linkage between Nigeria and the rest of the world and the degree of her exposure to various shocks.

The relationship between GDP (the ultimate variable of interest) and the other variables shall be examined using the Vector Autoregressive (VAR) model with international crude oil price, terms of trade, U.S. Treasury bond rate, capital inflows, monetary and fiscal policy as well as the global financial crisis as explanatory variables. The inclusion of the term of trade variable in this research is borne from the knowledge that most developing and emerging economies were affected by the recent global financial crisis through trade links. Trade has been central in explaining economic fluctuations in many developing countries and terms of trade volatility affect countries income volatility through trade openness, thereby

exposing them to external shocks (Rodrik, 2001; Calderon et al., 2005). Also, studies have shown that changes regarding trade shocks explain real output volatility (Ahmed, 2003; Broda, 2004; Raddatz, 2007). U.S. Treasury bond rate comes into the model because Nigeria (a developing economy) seeks better investment opportunities abroad by investing in the U.S. financial market and government securities. Hence, the episode of the recent global financial crisis presented a case of financial shock in the centre affecting the periphery, as opined by Díaz-Alejandro (1983); Díaz-Alejandro et al. (1984) and Calvo et al. (1993).

Considering the importance of oil in the country's economic fortune and the fact that international crude oil price is volatile and unpredictable, this makes international crude oil price an important variable in this research. Nigeria is highly dependent on oil for government revenue and to build her reserves (foreign exchange). Foreign exchange earnings from oil exports constitute over 24.7% of the country's foreign exchange earnings; while gross oil revenue stood at about 7.6% of GDP, representing 67.5% of the total federally-collected revenue (CBN, 2014). Capital inflows are prone to sudden stops (capital reversals) during crisis periods. Calvo et al. (2006) and Calvo et al. (2008) attributed systemic sudden stop events to episodes of capital inflow collapse. Sudden stops are large (and often unexpected) fall in international capital inflows or a sharp reversal in aggregate capital flows to a country, accompanied by a sharp rise in its credit spreads (Claessens and Kose, 2013). Milesi-Ferretti and Tille (2011) and Rose and Spiegel (2011) also attributed many episodes of sudden stops to global shocks. This is why capital inflow is captured as one element of external shock to the economy in this research.

Government expenditure, which is categorised into capital and recurrent, is an important fiscal policy tool that the Nigerian government uses to steer the economy towards its desired path. Government influences aggregate demand through its consumption and expenditure. According to Olukayode (2009) and Torruam et al. (2014) government expenditure has been seen to be growth enhancing in most

economies, especially where the bulk of the spending within the economy is driven by government. This has been the case of Nigeria where most businesses and household depend on government funding and spending to drive most of their economic activities. Over the last 20 years, the recurrent expenditure component of government expenditure, which goes to wages and salaries and government consumption expenditure, has stood at over 70.0% of the total. Capturing the impact of fiscal policy is important because it is a veritable tool in economic management and in promoting such macroeconomic objectives as price stability, economic growth, and balance of payments equilibrium (CBN, 2013). Also, it is of importance to evaluate the role of domestic policies in the face of these external shocks, as these shocks will not act in isolation, but will interact with other variables within the economy. It is on the premise of the above that this variable is used to capture the effect of domestic fiscal policy on output performance in Nigeria (Aarle and Sosoian, 2010; Sosa and Cashin, 2013).

Having taken cognisance of the fiscal dimension of domestic policy, it is pertinent also to evaluate the role of monetary policy (monetary dimension) in assessing the impact of these external shocks on Nigeria's output performance. Money supply (M2) is used as a measure of monetary policy. The Central Bank of Nigeria which is the apex monetary institution uses the money supply to steer the economy towards the achievement of price and exchange rate stability. The broad money (M2) is defined to include narrow money plus savings and time deposits, as well as foreign denominated deposits (CBN, 2006). The CBN in its monetary programming targets money supply as a means of targeting inflation, because inflation in Nigeria is seen as a monetary phenomenon. Hence, the CBN adopts a monetary targeting policy framework to achieve its objective of price stability (Musa et al., 2014). This variable is used to capture the effect of domestic monetary policy on Nigeria's output performance (Aarle and Sosoian, 2010; Sosa and Cashin, 2013). The global financial crisis, on the other hand, is introduced into the model as a dummy to capture the period of the crisis. It is used to assess the behaviour of output when there was a crisis and when there was no crisis (with particular reference to the

2007/2008 global financial crisis). This period also depicts the period where the Nigerian economy was hit by various shocks owing to its linkage with the rest of the world. The crisis impacted on key macroeconomic variables through the shocks it transmitted into the economy and rendered domestic policies ineffective.

The study employs the vector autoregression (VAR) technique to evaluate the impact of the shock variables on Nigeria's output performance. The VAR model is selected because it is a flexible and easy to use model for multivariate time series analysis and it has been very successful in this kind of task. It is a variant of the time series from the univariate autoregressive model to the dynamic multivariate time series. The VAR model is a veritable tool used for structural inference and policy analysis. In structural analysis, certain assumptions are imposed on the causal structure of the data under investigation, and a summary of the outcome of the causal impacts of the expected shocks or innovations to the variable of interest in the model is generated. These causal impacts are presented in the impulse response functions (IRF) and forecast error variance decompositions (VDC). The associated IRF and VDC have proven to be useful tools for macroeconomic policy analysis, and they have been the subject of many studies since Sims (1980).

Furthermore, the IRF involves each variable in the model being expressed as a function of its current and lagged values, plus an error term and it allows for the dynamic effects of shocks from one variable to all the other variables in the model to be examined (Ayadi et al., 2000). The impulse response is a term used widely, but in economics, it's used to refer to contemporary macroeconomic modelling and to describe how the economy reacts over time to economic shocks from exogenous factors. It is used to measure the reaction of endogenous economic factors - factors within the economy - like output, consumption, investment and employment, at the time of a shock and at some times after that. Conversely, the VDC complements the IRF analysis in that, the variance of forecast errors in a given variable is assigned to self-shock, and the same is done to the other variables in the VAR (Brown and Yücel, 1999).

1.6 Structure of the Thesis

The thesis is structured into six chapters. Following the introduction is chapter two. It reviews definitional and conceptual issues as it relates to the financial crisis, causes and classification of the financial crisis, as well as a peek into the recent 2007/2008 global financial crisis. It further reviews theoretical models that best captures the recent global financial crisis and how external shocks are transmitted into the economy, as well as methodologies used in previous impact studies. It outlines previous studies that had used various econometric models to evaluate the impact of external factors, and examines empirical studies on the impact of financial crisis and external factors on economic performance, with the aim of identifying gaps in the literature.

Chapter three focuses on the overview of the Nigerian economy, highlighting various economic sectors. It discusses the performance of the Nigerian economy over the review period. The chapter also takes a cursory look at how the global financial crisis affected the Nigerian economy through the various shocks transmitted and the policy response that was taken by both the Federal Government and the Central Bank of Nigeria (CBN). Chapter four concentrates on data and methodological issues. The empirical methodology is discussed and adopted - the vector autoregressive (VAR) model. In this chapter, we try to measure or assess the magnitude of the fluctuations in the economic variable of interest, which are driven by the shock variables. The results of the study are presented in chapter five. The analysis in chapter five uses annual data sourced from two reputable databases: the Central Bank of Nigeria (CBN) and the International Financial Statistics (IFS) of the International Monetary Fund (IMF) for the period 1981-2015. Chapter six presents the summary of the main findings, empirical results, policy implications, the limitation of the thesis, and suggestions for future research.

Chapter Two

Literature Review on Global Financial Crisis, Output and External Shocks

2.1 Introduction

This chapter reviews definitional and conceptual issues as they relate to financial crisis, its causes and the classification of financial crisis, as well as some insights into the recent global financial crisis, which started in 2007/2008, having its origin in the subprime mortgage sector in the United States. The review of these concepts is necessary given the main objective of this research, which is to evaluate the impact of external shocks, as transmitted through the global financial crisis on Nigeria's output performance. The chapter further reviews some business cycle theories that would help in the understanding of how the global financial crisis worked and how external shocks are transmitted into the economy. The chapter also examines the empirical studies on the impact of the financial crisis and external factors on various macroeconomic measures. Finally, the last section of this chapter assesses the methodologies used in previous impact studies. The review in this chapter is expected to guide in the discussion of the issue at hand and identify the way forward for this research.

2.2 Definitional and Conceptual Issues on Financial Crisis

This section will examine some definition and concepts relating to financial crisis. It is worthy of note that in its broadest sense, the term financial crisis is used to connote a situation where, for some reason, a huge part of the asset or value of an institution or institutions is eroded or lost. Claessens and Kose (2013) point out that crisis is complex, depending on its level or severity, and are extreme manifestations of the interactions between the financial sector and the real economy. As such, the need to understand financial crises becomes pertinent and requires an understanding of macro-financial linkages.

Mishkin (1992) defines financial crisis from the asymmetric information theory standpoint. He stated that a financial crisis is a disruption to financial markets in

which adverse selection and moral hazard problems become much worse so that financial markets are unable to efficiently channel funds to those who have the most productive investment opportunities. He notes that a financial crisis hampers the efficient functioning of financial markets and leads to a sharp contraction in economic activity. Claessens and Kose (2013) noted that financial crisis has no boundaries as it can affect both small and large countries, as well as poor and rich ones. It can originate from domestic (private or public sectors) or external sources. Also, that these crises take different shapes and sizes, evolve into different forms, and rapidly spread across borders.

Eichengreen and Portes (1987) defines a financial crisis as a disturbance to financial markets, associated typically with falling asset prices and insolvency among debtors and intermediaries, which spreads through the financial system, disrupting the market's capacity to allocate capital. Their definition tries to distinguish between the generalised financial crisis and isolated bank failures, debt defaults and foreign exchange market disturbances. Reinhart and Rogoff (2009) described it as an equal opportunity menace. Taking into consideration the factors explaining financial crisis, a financial crisis can also be defined as an amalgam of events, taking into account huge changes in credit volume and asset prices, severe disruptions in financial intermediation, notably the supply of external financing, large-scale balance sheet problems, and the need for large-scale government support (Claessens and Kose, 2013).

Asset and credit booms are key elements in a financial crisis, and more often than not, they culminate into bursts. The global financial integration of most national financial markets has made it easy for asset and credit bubbles to spill over across borders easily. Certain developments in asset prices result in booms, thereby creating bubbles. These developments cause asset prices to deviate from what fundamentals would suggest and display behaviours that violate standard predictions in a seemingly perfect financial market (Evanoff et al., 2012; Schularick and Taylor, 2012). Garber (2000) defines a bubble as the part of a grossly upward

asset price movement that cannot be explained based on fundamentals. Claessens and Kose (2013) note that during these periods of booms, certain asset prices increased very rapidly in a short period, followed by sharp corrections. They point to the house prices in some countries, which displayed this pattern and followed this inverse U-shape pattern, in the recent financial crisis.

Similar to the asset price boom is the credit boom (a rapid increase in credit), a common event that precedes a financial crisis. Factors such as shocks and structural changes in markets can set off a credit boom. Claessens et al. (2010), Mendoza and Terrones (2008, 2012), Dell'Ariccia et al. (2013) and Magud et al. (2014) examined the factors that can trigger a credit boom and burst cycle. Some of the shock factors include changes in productivity, economic policies (accommodative monetary policies, especially for extended periods), capital flows (sharp increases in international financial flows), institutional weakness, the decline in lending standards, as well as structural factors (financial liberalisation and innovation). Claessens and Kose (2013) note that one of the common characteristics of episodes of financial crisis in the more recent and distant past has been significant growth in credit (and external financing), accompanied by bursts in credit markets and sharp corrections in asset prices. They also point out some financial crisis that mimicked this pattern: the Australian boom and burst of the 1880-90s, the East Asian financial crisis in the late-1990s, and the experience of the United States in the late 1920s and early 1930s.

The multidimensional nature of the events that occur during a financial crisis makes it difficult to characterise it using a single indicator. Different crisis has different origin and causes. Some of the factors that drive a crisis have been identified in several studies, yet definitively identifying the root causes have proven difficult. However, literature has provided several factors that most often appear to be at the centre of the discussion on financial crises. These factors include: sudden runs on banks, contagion and spillovers among financial markets, limits to arbitrage during times of stress, emergence of asset bursts, credit crunches,

firesales as well as the idea of 'animal spirits' (as a source of financial market movements) (Keynes, 1930; Minsky, 1975; Kindleberger and Aliber, 2005).

A crisis can also be policy-induced. Calomiris (2009) notes that the lack of consistency across government interventions and other policy measures in advanced economies were partly the key factors in the recent financial crisis. Claessens and Kose (2013) list four factors common to both the recent financial crisis and past crisis: unsustainable increases in asset price, credit booms resulting in excessive debt burdens, build-up of marginal loans and systemic risk, and inappropriate regulation and supervision that could not keep up with financial innovation and stay ahead of the crisis when it erupted. However, Claessens and Kose (2013) notes that the recent financial crisis brought along with it some new factors: widely used complex and opaque financial instruments, the increased interconnectedness among financial markets due to globalisation and financial liberalisation, a high degree of financial leveraging, and the key role played by the household sector.

Widespread global economic integration, globalisation and uncontrolled speculation have been seen to be at the centre of the financial and economic crisis in developing economies (Kräussl, 2005). Rashmi (2009) study revealed that bank credit serves as a source of globalisation or move towards global integration. The author noted that credit as a source of globalisation, links states and countries in global finance. Specific crisis occurs due to market failures and spread to other countries/regions through contagion. However, Caprio (1998); Kaminsky and Reinhart (1999); William (2000) and Kräussl (2005) identify three general forms of financial instability that have constituted most forms of financial crisis as short-term volatility, medium term misalignments including excessive international capital flows, and contagion.

Global factors such as deterioration in terms of trade, shocks to world interest rates and commodity prices, as well as the role of common lender can play important

roles in driving sovereign, currency, balance-of-payments, and sudden stops which are part of the elements of a financial crisis (Kaminsky and Reinhart, 2001; Obstfeld and Rogoff, 2009; Forbes, 2012; Jordà et al., 2012; Obstfeld, 2012). However, these global factors can themselves be products of a crisis, as in the case of the recent crisis, where interest rates and commodity prices adjusted rapidly due to the onset of the crisis.

Borio and Lowe (2002) and Cardarelli et al. (2009) note that crisis is typically preceded by sharp increases in credit and asset prices, large booms in residential investment, as well as deteriorating current account balances. This assertion is consistent with Reinhart and Rogoff (2008a, 2008b, 2009) who found that systemic banking crisis is typically preceded by credit booms and asset price bubbles and with Herring and Wachter (2003) who show that many financial crises are the result of bubbles in real estate markets.

Some authors attribute the cause of the recent global financial crisis to structural factors. Rajan (2010) points to inequality caused by the problem of stagnating incomes in the United States as the cause. That the crisis was triggered by the government's response to the problem by opening the flood-gates of mortgage credit, which led to the housing bubble and finally to the financial crisis. This claim was supported by Hemerijck et al. (2009) who argued that the root cause of the crisis was what he called the reverse redistribution of income in advanced industrial countries, the unparalleled increase in income and wealth inequalities in the last three decades. Galbraith (2012) isolated the movement of the stock market, especially the NASDAQ, as the driving force behind the income inequality.

Avgouleas (2008) and Stiglitz (2010) attributes the cause of the recent global financial crisis to the complexity of Credit Defaults Swaps (CDS), sub-prime mortgages, complex Collateralized Debt Obligations (CDO) and other Asset-Backed Securities (ABS). They also attribute the cause to poor underwriting standards for subprime mortgages, weak risk management frameworks, and flaws

in credit rating, as well as inadequate regulatory policies that failed to mitigate risk management weakness.

With particular reference to the 2007/2008 global financial crisis, the above factors, in combination with the other factors common to other crisis and propelled by poor government interventions at the inception of the crisis, paved the way for the worst financial crisis since the Great Depression. This crisis transmitted massive shocks across the world economies. The impact of this crisis led to massive government outlays and guarantees to restore confidence in the financial systems. It triggered a series of shocks in most of the world economies, allowing most of them to experience the direct or indirect impact of the crisis through various shock factors. The effect of the crisis still lingers in many developed, developing and emerging economies, and is persisting in some European and African countries.

2.3 Classification of Financial Crisis

2.3.1 Currency Crisis

Claessens and Kose (2013) defines a currency crisis as a speculative attack on the currency resulting in a devaluation (or sharp depreciation), or forcing the authorities to defend the currency by expending a large amount of international reserves, or sharply raising interest rates, or imposing capital controls. Bordo et al. (2001) define it as a forced change in parity, abandonment of a pegged exchange rate, or an international rescue.

Several factors can trigger a currency crisis. One of such factors is over-borrowing by banks, which is induced by government subsidies. This can occur to the extent that, in the long run, the government would have to bail out failing banks. The ripple effect from the over-borrowing can trigger a currency crisis (McKinnon and Pill, 1996; Krugman, 1999; Corsetti et al., 1998). A currency crisis can also be induced through fiscal concerns and volatile real exchange rate movements (Burnside et al. 2001, 2004). They note that this kind of crisis can be self-fulfilling.

Claessens and Kose (2013) identified three generations of models used to explain currency crisis in the last four decades.

The first generation models were hinged on the collapse in the price of gold, which was used as a nominal anchor before the floating of the exchange rates in the 1970s. They show that speculative investors can launch an attack on a fixed or pegged currency, if they expect that a government has been running excessive deficits financed with central bank credit. They hang on to the currency in anticipation that the exchange rate regime will persist, but start to off-load it as soon as they perceive that the regime is about to end. This leads to the collapse of the currency, as the central bank loses its liquid assets or foreign currency used to support the exchange rate. These models were called the 'KFG' models, because they were derived from the seminal papers of Krugman (1979) and Flood and Garber (1984).

In the second generation models, uncertainties about the willingness of a government to sustain the existing exchange rate regime (the peg) can result in multiple equilibria and currency crisis (Obstfeld and Rogoff, 1986). These models see multiple equilibria as important. The plausible reason why in these models investors attack the currency is essentially the expectation that other investors will attack the currency. Lastly, the Asian crisis of the late 1990s largely inspired the third generation currency crisis models. These models look at the causes of a currency crisis from the perspective of a rapid deterioration of the balance sheets, fluctuations in asset prices and exchange rates. They tend to show how currency crisis can arise from discrepancies in balance sheets in the financial and corporate sectors. Chang and Velasco (2000) show that a currency/banking crisis can occur if local banks have large debts outstanding denominated in foreign currency.

2.3.2 Sudden Stops Crisis (Capital Account or Balance of Payment)

A sudden stop (or a capital account or balance of payments crisis) is defined by a large (and often unexpected) fall in international capital inflows or a sharp reversal

in aggregate capital flows to a country, accompanied by a sharp rise in its credit spreads (Claessens and Kose, 2013). Discussions on sudden stops typically point to disruptions in the supply of external financing. Claessens and Kose (2013) note that international factors (represented by changes in international interest rates or spreads on risky assets) tend to play a crucial role in sudden stop models in causing 'sudden stops' in capital flows. The authors also posited that the current account reversals and the real exchange rate depreciation experienced in emerging markets during a crisis could be accounted for in these models.

Calvo et al. (2006) define systemic sudden stop events as episodes with capital inflow collapse, rapidly increasing emerging market aggregate bond spreads, with severe output losses and dire social consequences. Calvo et al. (2008) looking at the characteristics of systemic sudden stops (3S) in capital flows point out two elements that are consistent in most episodes of sudden stops: a small supply of tradable goods relative to domestic absorption (a proxy for potential changes in the real exchange rate) and a domestic banking system with large foreign exchange denominated debts. Empirical studies such as Milesi-Ferretti and Tille (2011) and Rose and Spiegel (2011) find that many episodes of sudden stops have been attributed to global shocks.

2.3.3 Debt Crisis (Foreign and Domestic)

Debt crisis occurs when a country cannot or does not service either of its foreign or domestic debts. The foreign debt component can take the form of a sovereign or private (or both) debt crisis. A domestic public debt crisis arises when the government of a country fails to honour its domestic fiscal obligations. The government can either explicitly default on its obligations, or inflate (otherwise debase its currency) or employ some form of financial repression as a means of defaulting on its debt obligation (Claessens and Kose, 2013). Most crises are not stand alone in most cases, as they tend to be interwoven. A debt crisis will more often than not involve sudden stops, currency or banking crisis (or various combinations), making it hard to identify the initial cause.

Claessens and Kose (2013) note that the risk of a debt crisis is increased by exposure to factors relating to financial integration, political economy and institutional environments. Also, that countries with weak governments (wasteful) and poorly supervised financial sectors, are more susceptible to shocks when they open up to capital flows. Moral hazard and inadequate supervision, together with unrestricted capital flows can lead to a crisis as banks incur currency risks (McKinnon and Pill, 1996, 1998).

2.3.4 Banking Crisis

Banking crisis stems from an actual or potential bank runs and failures, which can cause banks to suspend the convertibility of their liabilities or compel the government to intervene to prevent such crisis by extending liquidity and capital assistance on a large scale (Claessens and Kose, 2013). Bordo et al. (2001) define a banking crisis as a period of financial distress that is severe enough to result in the erosion of most or all of the capital in the banking system.

Bank runs occurs when a bank is perceived as going insolvent, leading to a huge number of customers withdrawing their deposits. This generates a spiral, leading more and more people to withdraw their deposits, and increasing the likelihood of a default. This impacts negatively on the bank such that it faces bankruptcy as it cannot liquidate assets fast enough to cover its short-term liabilities. The banking system is fragile and very susceptible to a crisis, as a small shock (real or financial) can easily culminate into a financial crisis (Laeven, 2011).

Banking crisis in most emerging economies was triggered by external factors such as: sharp movements in capital flows, global interest rates and commodity prices, which led to issues of non-performing loans (Claessens and Kose, 2013). Some common structural problems such as: poor market discipline (caused by moral hazard) and excessive deposit insurance, poor corporate governance structure, weak supervision, and limited disclosure also lead to a banking crisis (Lindgren et

al., 1996; Barth et al., 2006; Čihák et al., 2012). Others include big state-ownership and limited competition in the financial system (dominance of banks), restricted entry from abroad, as well as an undiversified financial system (Caprio and Honohan, 2001). Fisman (2001) – Indonesia, La Porta et al. (2000) and Haber (2005) – Mexico, and Laeven (2001) – Russia, point to connected lending as a causative factor in a banking crisis. This causes a build-up of systemic risk when corporations and politicians borrow too much from banks.

Having reviewed these crises, it is worthy of note that different types of crisis are interconnected and overlap such that they are not mutually exclusive events. This overlapping nature of a crisis can most often make it misleading to properly classify a crisis as only of one type. One crisis can lead to the other or different types can take place simultaneously due to common factors. Claessens and Kose (2013) note that crisis in emerging markets have often been a mixture of currency and banking crisis, often linked to sudden stops in capital flows, and most times culminating into a sovereign debt crisis. Consequently, it is imperative to be cautious when trying to classify certain crisis given the considerable ambiguity and thin line between the different types of financial crisis. However, the important thing to note in the above discussion is that a crisis in whatever form transmits shocks through various macroeconomic variables or channels into the various sectors of the economy.

2.4 The 2007/2008 Global Financial crisis

The recent global financial turmoil of 2007/2008 has unquestionably been adjudged the first truly major global crisis since the Great Depression of 1929-32. It has its origin in the U.S. subprime mortgage market. Before the burst, there was a rapid expansion in this market, evolving from a small niche segment to a major portion of the U.S. mortgage market. This rapid expansion, many have attributed to the economic progress resulting from fundamentals such as gains in household income and diversification benefits from asset securitisation (Dell'Ariccia et al., 2012).

The bursting of the subprime bubble caused the values of securities which were tied to the U.S. real estate pricing to fall, creating distress for financial institutions globally. The crisis was mainly triggered by the interaction of complex policies that encouraged easy access to funds for subprime borrowers to acquire homes, overvaluation of bundled subprime mortgages, unguided practices by both lenders and borrower, prioritization of short-term deal flow over long-term value creation, and a lack of adequate capital holdings to back the financial commitments (Simkovic, 2009; Levin and Coburn, 2011; FCIC, 2011). Virtually all economies of the world (advanced and emerging) were affected by the crisis which spread rapidly. Equity markets worldwide were not spared, as many countries experienced more dramatic equity market crashes than the United States, due to the effect of 'contagion' (Bekaert et al., 2011).

Reinhart and Rogoff (2008) saw the crisis as a credit boom gone bad. However, evidence by analysts of the crisis suggests that the credit boom in the subprime market was followed by a neglect in credit standards and excessive risk-taking by lenders (Fitch Ratings, 2007). This was reinforced by the increased delinquency rates of mortgage clients and insolvency of many of the mortgage lenders (Dell'Ariccia et al., 2012).

Many studies have put forth factors responsible for this crisis and how these factors are not much different from the previous crisis (Calomiris, 2009; Gorton, 2009, 2010; Claessens et al., 2010 and many others). However, the factors listed by Claessens and Kose (2013) seem to describe this crisis best. These are the unsustainable increase in asset prices; huge debt burden resulting from the credit boom; build-up of marginal loans and systemic risk; and the inability of supervision and regulation to keep pace with financial innovation.

2.5 Interaction between Financial Crisis and Business Cycle

Financial crisis and business cycle, though different in many ways, are both cross-cutting and can be looked at within the same context. The interaction between financial crisis and business cycle was articulated in the alternative view of understanding crisis, which asserts that crises are a fundamental part of the business cycle and result from shocks to economic fundamentals (Mitchell, 1941). This view posits that crises are an integral part of the business cycle. They further assert that financial crisis is a natural outgrowth of the business cycle, a view that has been upheld by several other authors (Gorton, 1988; Calomiris and Gorton, 1991; Allen and Gale, 1998, 2000a, b & c, 2009; Calomiris and Mason, 2003). Financial crisis in most cases occurs near the peak of the business cycle, with recessions looming at the far end of the crisis (Gorton, 1988; Gorton and Winton, 2000). According to Claessens and Kose (2013), the financial crisis in many emerging markets was triggered by developments outside these markets such as: sudden stops in capital flows (or capital reversals), fluctuations in commodity prices and world interest rates. These factors are external to the economy (external shocks) and can also trigger a business cycle.

Macroeconomic and financial consequences of a business cycle or financial crisis are generally severe and share many commonalities in the way macroeconomic variables behave during either of the episodes. In both cases, there are most often large output losses, significant declines in other macroeconomic variables (consumption, investment and industrial production), and financial variables follow suit (Claessens and Kose, 2013). Claessens et al. (2009, 2012) also noted that financial crisis has huge economic costs and can trigger recessions, which is a phase in the business cycle. Claessens and Kose (2013) further supported this point when they stated that there have been many recessions associated with financial crisis and that financial crisis tends to make recessions worse than a business cycle recession. This is because these crises generates unanticipated shocks through some key macroeconomic variables and transmit same into the economy via these variables.

Claessens et al. (2012) in their study on how business and financial cycles interact showed that recessions are more costly when associated with credit crunches and housing bursts (factors related to both financial crisis and business cycle). They used the traditional business cycle methodology to show recessions. As pointed out by Claessens and Kose (2013), in many parts of the world, the 1991 global recession coincided with financial crisis, along-side hard times in the U.S. credit markets, Europe banking and currency crisis, as well as the asset price bubble burst in Japan. This resulted in a decline in world per capita GDP growth of about 0.2% in 1991, compared with a growth of about 2.0% in a typical year. Borio (2014) asserted that given the prevailing macroeconomic environment of at least the last three decades, it becomes impossible to separate business fluctuations from financial cycle as they are both intertwined.

Bordo and Haubrich (2012) in their study investigated 27 episodes of business cycles in America and found that, of the 27 episodes, only four did not have some form of financial crisis. Roubini (2009), and Reinhart and Rogoff (2009) have argued that in the event of a downturn in the business cycle (recession), the recovery is unusually sluggish and this has been reflected in the severity of the 2007-2008 financial crisis. Bordo and Haubrich (2012) seem to agree with this assertion, noting that if the above is the case, then it applies to the case of the U.S. business cycles in the past century and a half, given the records. Furthermore, it is in consideration of the recent crisis as a business cycle that the monetary business cycle theories have come back to life and regained their relevance and timeliness in explaining business fluctuations. These theories see monetary mismanagement as the bane of macroeconomic dysfunctions in the intertemporal allocation of resources (Dobrescu et al., 2012).

Knell (2015) in his essay noted that Hyman Minsky used the financial instability hypothesis to show how fluctuations between robustness and fragility in financial markets give rise to business cycles in an economic system. He also noted that

this line of thought has been recognised by some economist to have come from the credit view of money and finance as put forth by Joseph Schumpeter, as well as from the financial theory of investment and investment theory of business cycles advocated by John Maynard Keynes. Suarez and Sussman (1997a, 1997b) noted that business cycles are endogenously created through moral-hazard relations between firms and financial institutions. This scenario was also the case in the recent crisis. The authors further noted that these relationships are formed within an institutional environment, which may affect the intensity of the fluctuations and structural change in the financial market, which in turn will affect the business cycle. In the second article, the authors noted that the sale of an asset and firm liquidation during a crisis could also play a central role in causing a business cycle. Thus, from the preceding, financial crisis and business cycles are interrelated, and so understanding financial cycles is as much the same as understanding business fluctuations. More importantly, both events generate external shocks, which is the focus of this study, from its origin to the periphery, therefore causing distortions in the receiving economy. Furthermore, it was important to look at the concept of financial crisis and understand the same in this study, as it is a veritable source of external shocks. Also, it is the context within which the study evaluates the impact of external shocks on Nigeria's output performance.

2.6 Theoretical Literature Review

Most often, crisis and boom and burst cycles are interrelated, and they follow several interconnected factors such as financial liberalization, globalization, global trade, cross-border banking, international investments, financial innovations, spillover effects, contagion (financial and international), abrupt capital flows reversal, leveraged common creditor, financial crisis, etc. (Kaminsky and Reinhart, 1999; Kaminsky et al., 2003; Allen and Gale, 2007).

However, economists have attempted to understand crisis through two broad approaches. One approach is as expounded by Kindleberger and Aliber (2005), that crisis occurs spontaneously as a result of panic. He sees a crisis as being self-

fulfilling, in that, if people anticipate a crisis and behave as though one is about to occur, then the crisis becomes self-fulfilling (like a prophecy), and vice versa. This view was further supported by the Diamond-Dybvig style account of bank runs in which extrinsic uncertainty plays a crucial role (Diamond and Dybvig, 1983). The alternative view asserts that crises are a fundamental part of the business cycle and results from shocks to economic fundamentals (Mitchell, 1941). This view further holds that financial crisis is a natural outgrowth of the business cycle and have been upheld by several other authors (Gorton, 1988; Calomiris and Gorton, 1991; Allen and Gale, 1998, 2000a, b & c, 2009; Calomiris and Mason, 2003). According to this view, crisis is not random events, but a rational response to unfolding economic circumstances. In other words, they are an integral part of the business cycle. This alternative view gives this research a basis to evaluate the impact of external shocks on Nigeria's output performance in the context of the global financial crisis, because, the global financial crisis has been seen as a source of external shocks. Also, all the arguments above have shown that financial crisis and business cycle are very much interrelated. Consequently, based on the above discussion and the alternative view on financial crisis, we examine some theories of business cycles. These theories will help us gain understanding of the nature and types of macroeconomic variables through which shocks are transmitted into the economy, as well as insight into the immediate past global financial crisis.

2.6.1 Theories of Business Cycles

Business or economic cycles are fluctuations (expansions, contractions and recoveries) in an economy. They are measured and tracked in terms of gross domestic product (GDP) and other macroeconomic variables around its long-term growth trend. These business cycles are also called booms and burst cycles. These cycles result in the rise in output and decrease in unemployment over time during periods of relatively rapid economic growth (booms or expansions), while contractions or recessions, which are the reverse, are depicted in periods of relative stagnation or decline in economic growth (Bormotov, 2009).

Theories of business cycles can be looked at from different perspectives, depending on the school of thought or by the determinants of the fluctuations in the cycle, i.e. exogeneity or endogeneity of the cycles. In some of the theories, the fluctuations in the cycle are caused by exogenous factors, in this sense, external shocks. These shocks can be random and non-cyclical, as well as positive or negative in nature. A positive shock has the tendency of increasing firms appetite for investment, through increases in capital stock. On the other hand, most post-Keynesians believe that external shocks may impact an economy and cause fluctuations in economic activity, but that fluctuations can still manifest even in the absence of shocks (Batra, 2002; Rebelo, 2005; Bormotov, 2009).

In the next section, we examine the Minsky's Financial Instability Hypothesis (FIH) theory of business cycle which has been adjudged as one of the most appropriate business cycle theories to explain the recent global financial crisis. Also, we examine the real business cycle (RBC) theory whose proponents believe that it is external shocks like innovation and technological progress that drive cycles. The RBC theory can be related to the alternative view earlier highlighted above. They believe that economic crisis and fluctuations can only emanate from external shock. We also discuss some of the variants of the real business cycle theory.

2.6.1.1 Minsky Financial Instability Hypothesis (FIH) Theory

An American economist, Hyman Minsky developed the 'financial instability hypothesis'. The basis of the FIH theory stems from the need for investors to finance investment through the financial market, given the critical role assigned to financial markets in some aggregate-demand based theories of the business cycle. The theoretical underpinning of this theory is based on the classification of the economy as a capitalist economy with huge capital assets and a complex and fragile financial system. The theory is set within the context of an economy in its expansion phase; with increased investors' optimism, changing rules and regulations on the level of debt and risk, and the general increase in prices of

financial assets and speculation. Speculation here is seen as the ability to gamble on the direction or forecast the future of the market (Keynes, 1936) or the process of financing assets whose value depend on future developments (Minsky, 1975).

According to Minsky, the kind of economic activities in capitalism leads to financial crisis, because there is increased borrowing during periods of economic prosperity, as lenders throw caution to the wind and both lenders and borrowers become increasingly reckless. The high investment expectations in the economy creates financial bubbles which are followed by bursts. Therefore, capitalism is more susceptible to shift from periods of financial stability to instability (Minsky, 1982). The FIH is a capitalist economic model, not dependent on exogenous shocks to create business cycles. The hypothesis maintains that business cycles are generated from: the internal dynamics of capitalist economies, and the system of interventions and regulations that are designed to keep the economy operating within reasonable bounds (Minsky, 1992).

He notes that after a period of recovery from a crisis, the economy is in the expansion phase approaching a smooth equilibrium path. Along this path, expectations of economic agents are progressively being met and, in Minsky's term, there is 'financial tranquillity' - a situation where debtors can meet their financial commitments. Risk assessment changes for both lenders and borrowers in this state of tranquillity, and both financial regulators and policymakers most often display weak regulatory standards. The general attitude in the economy towards risk and liability structure changes, creating a more fragile financial system. In Minsky's view, this financial system fragility increases as debt levels increase, short-term debt increases - proportion of short-term debt increases as firms take advantage of a normal yield curve, in which long-term interest rates are higher than short-term rates, liquidity falls, and speculative and Ponzi activities increase (Minsky, 1977). There is an increase in loans disbursement (even loans that would have ordinarily been rejected) as risk premiums fall and borrowers increasingly finance their projects in speculative and risky ways.

This leads to a boom, as investment increases. The increased pressure on the financial system sets off a financial crisis, which leads to a rapid increase in interest rates and a contraction of credit and investment. Minsky points out that there is increased unwillingness to finance investment during the financial crisis. Profits are negatively affected by the fall in investment expenditure, and this increases the difficulty of meeting debt payment obligations. The possibility of a debt-deflation spiral shows up at this point, resulting in defaults in debt payment obligation leading to a fall in aggregate demand, fall in prices, increases in the real value of outstanding debt payment obligations, and speeds up the resulting general downward spiral (Fisher, 1933). This leads to increased regulations and a return to cautious financial practices. Over time, the whole cycle starts again with new and different financial instruments and institutions.

Minsky's FIH theory received prominence after the financial crisis of 2007/2008 and models such as that of Ryoo (2010), which produces short cycles around a Minskian long wave, have been developed from Minsky's theory. The financial crisis of 2007/2008 created renewed interest in Minsky's work, after being ignored by mainstream economics in the 1970s and 1980s. Minsky's FIH theory basically offered considerable explanation for the fundamentals that drove the global financial crisis. Fundamentals such as the movement from hedge lending to speculative and Ponzi lending (illustrated by the sub-prime mortgage lending). Also, the increase in asset prices (especially house prices) above long-term price-to-income ratios; the growth of confidence in rising asset prices and continued economic growth; as well as the failure of credit rating agencies to adequately see the risk in mortgage-backed securities. Other fundamentals included the willingness of banks to borrow money from money markets to enable more profitable lending; and the culture of risk-taking emerging in banks, with high rewards for rapid growth (Minsky, 1982).

Looking at the implications of this theory, Minsky argued that government regulation is necessary to prevent financial bubble since capitalism was prone to instability. He proposed that government should make regulations such as to prevent speculative and Ponzi lending and require banks to keep a proportion of their liquidity in cash reserves. Furthermore, government should require banks to contribute to a stability fund during boom years, which is to be used in times of crisis; as well as place stringent requirements for mortgage lending, i.e. not allowing self-certification mortgages, interest-only mortgages etc. Also, create the willingness to act on asset price inflation, e.g. raising interest rates if there is excess house price inflation; split up banks between traditional saving divisions and more risky investment banking; as well as build a strong Central Bank that is willing to act as a lender of last resort (Minsky, 1992).

2.6.1.2 Critique of the Minsky's Financial Instability Hypothesis Theory

Though Minsky's financial instability hypothesis proffered a beautiful explanation to the booms and burst cycles in a capitalist economy, as corroborated by the 2007/2008 financial crisis, his theory only provides a partial and incomplete explanation to the 2007/2008 crisis. Minsky's theory has been challenged by the new Marxist view of Foster and McChesney (2010), the social structure of accumulation (SSA) view of Kotz (2009), and the structural Keynesians view of (Palley, 2011). These latter views trace the origin of the financial crisis to developments within the real economy.

They opined that if the crisis were a 'pure' Minsky crisis, all that would be needed would be financial regulation aimed at putting speculation and excessive risk-taking back in the box, and normal growth will return once that problem is remedied. The new Marxist, SSA and structural Keynesians believe that though increased financial regulation as espoused by Minsky is needed to maintain economic stability, it is not the ultimate solution to the crisis and restoration of the economy to full employment. Rather, that strict financial regulation can slow growth by tightening credit which is crucial to growth (Palley, 2007).

One of the criticisms of Minsky's hypothesis is its inability to account for the influence of household debt and its contribution to the 2007/2008 financial crisis. His hypothesis did not account for how this affected financial fragility within the markets. As risk assessment changed for both lenders and borrowers, many high-risk individuals/households were borrowed money to buy houses, not considering whether they could afford to pay back or not. Subsequently, this led to an unprecedented rate of default when the bubble burst, i.e. a historic increase in consumer defaults (Brown et al., 2013). The rate of consumer default increased by 4.5% compared with an average of 1.7% between 1979-2006 (Mayer et al., 2009). This increased the level of financial fragility which resulted in the housing bubble burst, causing huge losses for financial institutions, as they could not sell the houses which they took back from their customers at the value they thought they would.

Other criticisms of Minsky's financial instability hypothesis is based on the fact that Minsky did not take into consideration the positive impact a Ponzi scheme could have on the inflows of a firm. Ponzi schemes are simply the case of 'borrowing from Peter to pay Paul' and may work as a survival strategy for a debtor during times of adverse shocks, without adversely affecting (in expected terms) Peter and Paul. If a debtor has good prospects but faces adverse shock in the short-term, borrowing comes in handy to cushion the effect of the shock. However, lenders also have time frames for their funds and cannot wait indefinitely for their returns, hence, borrowing from Peter to pay Paul becomes the best possible option. Ryoo (2013) noted that the Ponzi scheme suggests a mismatch between inflows and repayments. However, over a long period, inflows may increase to cover such repayments if the bulk of the industry's firms carry out similar schemes of increasing their debt - the paradox of debt. This investment, in the long-run, will boost aggregate demand and profits, offsetting Minsky's idea of only increasing debt, because the inflows would outweigh it.

2.6.1.3 Real Business Cycle Theory (RBC)

The proponents of the RBC model followed the work of Kydland and Prescott (1982), the most referred RBC model. Their model, which focussed on neoclassical considerations won the Nobel Prize in economics. The RBC models were developed as a reaction to the failure of the Keynesian model to proffer a solution or explain the issues of the 1970s, as well as the oil crisis and stagflation (Stadler, 1994). Real business cycle theorists believe that it is external shocks like innovation and technological progress that drive cycles, and that issues like excessive overcapacity can drive downturns. They believe that economic crisis and fluctuations cannot emanate from a monetary shock, but only from an external shock, such as an innovation (Rebelo, 2005; De Vroey and Pensieroso, 2006). The real business cycle theory is built on certain strong assumptions about the drivers of these business cycle phases. The main fundamental assumption behind the real business cycle theory is that one must have at the back of his mind that business cycles are driven entirely by technology shocks rather than by monetary shocks or changes in expectations (Kydland and Prescott, 1982; Rebelo, 2005).

The RBC theory accounts for fluctuations in the business cycle in terms of real (rather than nominal) shocks that affect the economy, which can be unexpected or unpredictable events. They consider technology shocks as unexpected or unanticipated technological development that impacts productivity. Apart from considering technological shocks as the main driver of the business cycle phases, the RBC theory sees business cycles as a natural and efficient response of the economy to those exogenous changes or developments in the real economic environment that can cause fluctuations (Kydland and Prescott, 1982; Rebelo, 2005; Gazda, 2010; Kiyotaki, 2011; Beker, 2012). The real business cycle theory focuses on the supply-side of the economy. They stress that fluctuations in the business cycle, are caused by real or supply-side shocks in technology due to exogenous changes. The shock in the form of technological advancement causes an upward shift in the production function. This increases investment, consumption and real output. The increase in investment leads to an increase in the capital

stock, which then leads to further increases in real output and consumption, and subsequently investment. This expansion process in the economy then continues progressively over time due to the change in technology (Kydland and Prescott, 1982; Stadler, 1994; Rebelo, 2005).

Typically, the RBC models have some distinctive features: (i) they avoid aggregation problem by using a representative agent framework, focusing on a representative household and firm, (ii) the firms and households optimize their explicit utility functions subject to budget and technology constraints, (iii) fluctuations in the cycle are caused by exogenous productivity shocks to technology that causes an upward or downward shift in the production function, which are transmitted through investment lags or inventory build up, intertemporal substitution of leisure and consumption smoothing (Stadler, 1994). Also, part of the basic assumptions of the RBC model are rational expectations, perfectly competitive markets, and perfect information.

The RBC theory is based on the following assumptions: single commodity in the economy; flexible prices and wages; real variables such as output and employment are not influenced by money supply and price level; fluctuations in employment are voluntary; population is given, hence, the labour force is fixed; economic agents in the economy are rational and identical; economic agents make optimising decisions; preferences for everyone are the same, and it depends only on consumption in one period (each year); the marginal utility from consumption diminishes as more consumption is preferred to less; the economy is subject to irregular (random) real supply-side shocks; the economy has a single sector; the rate of change in technology is substantial enough to affect the whole economy (which is viewed as a single sector); existence of constant returns to scale production-technology; and the economy is in a steady state (Stadler, 1994; Kydland and Prescott, 1982; Rebelo, 2005; Kiyotaki, 2011). A prototype of the RBC model is presented in appendix A.

2.6.1.4 Critique of the Real Business Cycle Theory (RBC)

Stadler (1994) discussed five criticisms of the RBC theory. Firstly, he noted that the economy-wide disturbances that drive these models have no independent evidence. Secondly, that there is no objective measure of the efficacy with which the RBC models account for cycles, as the models are not subject to formal econometric tests. Also, he stated that the RBC models could not account for the periodicity of cycles, because they have weak mechanisms for transmitting shocks through time and the cycles they generate do not match reality. Furthermore, recessions cannot be explained by RBC models because it would require a huge fall in productivity in the whole economy. Lastly, the models use the representative agent framework which restricts these models from being able to address welfare or policy issues.

Summers (1986) asserts that the RBC models have nothing to do with the business cycle phenomena observed in the United States or other capitalist economies. Even though the proponents of the RBC theory hold firm to the fact that the theory is realistic, based on large fluctuations in output and employment exhibited in the US economy. He states that there is no discussion of the source or nature of the shocks espoused by the RBC model, nor any microeconomic evidence of their importance. That there is an implicit restriction on the process of technological change, given the way, the shock enters the model. According to critics, technological shocks that result in changes in total factor productivity are as good as not being in existence. Therefore, the assumption of the presence of large technological shocks is unjustified in the RBC theory (Mankiw, 1989). According to Mankiw (1989), real business cycle theory does not provide an empirically plausible explanation of economic fluctuations.

Further criticisms of the RBC theory by other economists is based on the grounds of the intertemporal substitution of leisure and work. That labour does not respond to expected real wage changes by reallocating leisure to work overtime. That shocks other than productivity shocks, such as wars and military build-ups, oil price

shocks, government expenditure, climate change, terms of trade, etc. have caused business cycles (Mendoza, 1995; Rebelo, 2005). The theory does not believe in the existence of (involuntary) unemployment or that money matters. Another major criticism is the inability of the model to explain the large negative shocks that cause a recession (Greenwald and Stiglitz, 1993). Kirman (1992) put forth a strong attack on the representative agent framework noting that the introduction of a small amount of agent heterogeneity can have destructive consequences.

2.6.1.5 Further Works on Real Business Cycle Models

Since the revolutionary work by Kydland and Prescott, the RBC theory has been extensively studied in the tradition of Kydland and Prescott, though with variations in practices. Over the period between the 1980s and 1990s, many researchers have explored the effects of different kinds of shocks, the mechanisms that propagate them, and the policy implications of these shocks. These researches incorporated shocks other than technology shocks into the baseline model to understand the effects they had on aggregate fluctuations. Real business cycle models emphasized the role of real shocks. It made particular reference to technology shocks as the main driver of business fluctuations (Kydland and Prescott, 1982). This initial thought has been the starting point for many theories and models in which technology shocks do not play a central role.

Consequently, various authors in contemporary RBC literature have tried to answer the question of what are the shocks that cause business fluctuations? Several literatures has identified, amongst others, monetary, fiscal, and oil price shocks as long-standing suspects. We, however, look at the various kinds of shocks that have been espoused in the literature and how the works of Kydland and Prescott have been expanded.

2.6.1.5.1 Technology Shocks

Kydland and Prescott (1982), and Long and Plosser (1983) underscore the importance of technology shock as a major source of fluctuations. Greenwood et

al. (1988) focus their attention on how technological changes affect the productivity of new capital goods when exploring the role of technology shocks in the business cycle. Other studies used various measures of technological shocks: Prescott (1986) derived total factor productivity (TFP) and used it as a measure of exogenous technology shocks; Basu (1996) and Burnside et al. (1996) consider variable capital utilization; Burnside et al. (1993) use variability in labour effort, and Jaimovich and Floetotto (2008) use changes in markup rates as a measure of technology shock. These studies argue that the size of true technology shocks, as measured by Prescott's TFP is likely to be much smaller using their variables.

2.6.1.5.2 Oil Shocks

Kim and Loungani (1992); Rotemberg and Woodford (1996); Finn (2000); and Barsky and Kilian (2004) studied the effects of oil or energy price shocks in RBC models. These studies show that oil or energy price shocks are not the major drivers of output fluctuations, though they improve the performance of the RBC models.

2.6.1.5.3 Fiscal Shocks

In some studies, the volatility of output generated by RBC models is increased by the presence of fiscal shocks. Christiano and Eichenbaum (1992); Baxter and King (1993); Braun (1994); and McGrattan (1994) looked at fiscal shocks through the effect of tax rate and government spending shocks in RBC models. Nevertheless, the cyclical variation in tax rates and government spending were not enough to justify fiscal shocks as a huge driver of business fluctuations. Ramey and Shapiro (1998) study the effects of changes in the composition of government spending. Burnside et al. (2004) consider the effects of large temporary increases in government spending in the presence of distortionary taxation.

2.6.1.5.4 Terms of Trade Shock

Mendoza (1995) investigated the effect of productivity and terms of trade shocks in an international business cycle model. The author shows that responses of real

exchange rates to these shocks are quite different, both qualitatively and quantitatively.

2.6.1.5.5 Monetary Shocks

Friedman and Schwartz (1963) in a comprehensive empirical study pointed out that monetary shocks are the major economic cause of business cycle fluctuations. They observed that sharp declines in the money stock occurred prior to severe economic downturns. Cooley and Hansen (1989) explore the effect of monetary shocks and a cash-in-advance constraint in their model. They show that the inclusion of these kind of shock variables have negligible effects on business cycle predictions. Bernanke et al. (1999) emphasise the role of credit frictions in influencing the response of the economy to both technology and monetary shocks. Gali et al. (2003) and Altig et al. (2011) in their models investigated the effect of a large short-run expansionary impact of a technology shock and found that it requires that monetary policy be accommodative.

Schreft (1992) and Ireland (1995), alongside Freeman and Kydland (2000) develop transaction-based models. Freeman and Kydland (2000) introduce a costly transaction technology into the standard growth model and find that monetary aggregates and output are positively correlated even though there is no causal relationship between money and output. Lucas (1980) and Lucas and Stokey (1987) develop cash-credit goods and cash-in-advance models. Saving (1971) and McCallum and Goodfriend (1987) develop shopping time models. Scheinkman and Weiss (1986); Fuerst (1992); and Christiano and Eichenbaum (1995) develop and explore limited participation models.

2.6.1.5.6 Investment-Specific Technical Change

Investment-specific technological change, as used in some studies, is a natural alternative to technology shocks. It enhances the productivity of new capital goods, thereby raising the real return to investment. Gordon (1990) used the relative price of investment goods in terms of consumption goods to measure the pace of

investment-specific technological change. He found that relative price declined dramatically in the past 40 years in the U.S. Businesses achieved higher productivity, and new goods are lighter, faster, more energy efficient, and more reliable than their predecessors. Greenwood et al. (1997) use growth accounting methods to investigate the role that investment-specific technological change played in generating post-war U.S. growth. They argue that investment-specific technological change generated 60% of the post-war growth in output per man-hour. Fisher (2003) use the neoclassical growth model to identify the effects of technological change on the U.S. business cycle. He finds that investment-specific technological change accounts for 50% and 40% of the variation in hours worked and in output, respectively.

In summary, the various debates that have enveloped the issue of fluctuations, external shocks, financial crisis and business cycle have not allowed for convergence towards a unifying theory that would allow for an acceptable explanation to these phenomena. Thus, from the preceding, it can be said that no one theory or explanation of financial crisis or business cycles is generally accepted by economists. This is because of the multiplicity of factors that are responsible for the different crisis, thus, making it impossible to identify a particular theory as the right or the correct explanation. Proponents of the various theories, construct these theories by introducing various elements and points of emphasis to suit their understanding of the underlying factor. Therefore, there is no best alternative than to evaluate each idea and compare it with others on the same subject, so as to draw a conclusion as reasonable as possible. Consequently, the question of concern here is about the most appropriate theory for the discussion at hand.

Minsky's financial instability hypothesis theory, which offered a considerable explanation for the fundamentals that drove the global financial crisis and the RBC theory on the role of real shocks in economic fluctuations are plausible theories for the discussion at hand. In early RBC analysis, exogenous shocks to productivity were the main source of shock. In recent times, the framework has been extended

to include the effects of other potential shocks. Therefore, in discussing the impact of external shocks on Nigeria's output performance, using the global financial crisis as a mechanism for the propagation of the external shocks, we will think along the lines of the RBC and Minsky's FIH theory as a theoretical basis for the study.

In conclusion, the above discussions on the RBC theory and Minsky's FIH theory have been to help in establishing the link between external shocks and the global financial crisis, and how they would impact on Nigeria's output performance. Also, these discussions lay the foundation for the use of these theories in the understanding of external shocks and how they were transmitted through the global financial crisis, as well as the relevance of these theories to the discussion at hand. The proponents of the RBC theory talked about how business cycles are caused by shocks, and the global financial crisis was a veritable source of shocks to the world economies as earlier established. Also, in the earlier discussions, we had established the interrelationship between financial crisis and business cycles. Thus, putting this debate in perspective, there is a wide consensus that the financial crisis reflected in the U.S. housing bubble and associated leverage, which led to a rise in uncertainty and various kinds of financial frictions, as well as the transmission of various economic shocks to the world economies (Krishnamurthy, 2010; Woodford, 2010; Rogoff, 2015).

Bernanke (1983) argued along similar lines in explaining that the loss of banking infrastructure during the Great Recession made the financial system less effective in intermediating savings and investment. Hence, if financial frictions and loss of intermediation are thought of as a demand or supply shock, then a financial crisis may have some similarities to a technology shock as posited by the RBC theory (Cerra and Saxena, 2017). Also, later scholarly works on the RBC theory did not only consider technological shocks but expanded the scope of the shocks to incorporate other kinds of shocks such as oil shocks, monetary shocks, term of trade shocks, fiscal shocks and many other kinds of shocks. The link between business cycle and financial crisis gives us a basis to use the RBC theory to

discuss external shocks as being propagated by the global financial crisis into the economy, as well as to evaluate the impact of these external shocks on Nigeria's output performance.

2.7 Empirical Literature Review

This sub-section of the chapter reviews the relevant empirical literature with respect to the issues of how external shocks and financial crisis affects various macroeconomic variables. The sub-section will further review the literature on methodological issues.

2.7.1 Financial Crisis and Economic Performance

Several studies have tried to assess the impact of the various crisis on different economic variables, sectors, markets and the real economy. These crises impacted greatly on large financial institutions as stock markets dropped worldwide and in many areas, the housing market crashed, prolonged unemployment, failure of key businesses, declines in consumer wealth, and a downturn in economic activity. It also impacted greatly on foreign trade, foreign direct investment (FDI) inflows, financial investments, financial variables, as well as the oil and commodities markets.

Boyd et al. (2005) investigated the real output losses associated with the modern banking crisis in some countries during the 1997 crisis. They found that, for the average sample country, the estimated present discounted value of crisis-related output losses is bounded between 63.0% and 302.0% of real per capita GDP in the last year before the crisis onset. The estimated average loss was this large primarily because they found evidence that post-crisis economic slowdowns often persist long after the crisis is officially over. However, in developed economies, they found that the banking crisis was not associated with any significant reduction in the growth of real per capita GDP. Kaminsky and Reinhart (1999) in their study found that during the 1997 Asian crisis, shocks across national borders were propagated by foreign banks. Also, the spread and intensity of the crisis throughout

the region were amplified by the reversal of credit lines by Japanese and European banks (the major lenders to emerging Asia).

Aly and Strazicich (2011) tested the impact of the recent financial crisis and global recession on economic growth rates in North Africa. Their results show that shocks from the crisis have only temporary effects on economic growth in the North African countries. While Das and Dutta (2013) evaluated whether the exogenous component of the global financial crisis affects OECD-DAC EU donor countries ODA disbursements to the LDCs and how it impacts on LDCs economic prosperity¹. They find that the global financial crisis in OECD-EU donor countries caused a significant downside in ODA flows to the LDCs and adversely affected their economic growth. Asghar et al. (2013) estimated the long-run and short-run effect of the global financial crisis of 2008 on inflation and found that it had a positive and significant impact on inflation in Pakistan.

Papageorgiou et al. (2011) investigated the short-run effects of the 2007-09 global financial crisis on growth in (mainly non-fuel exporting) low-income countries (LICs). They found that aggregate LIC output declined sharply (the growth declines was traceable to the decline in export demand) because LICs were interlinked. Other studies found that the growth effects of the crisis featured in declines in external demand, commodity prices, terms of trade, tight global financial conditions, a sharp contraction in export growth, FDI, remittances inflows and lower than committed aid (Drummond and Ramirez, 2009; IMF, 2009b, 2009c).

In the case of Cambodia, Jalilian et al. (2010) noted that the global financial crisis hit the country through its second-round effects on trade, private capital flows and, ultimately, the country's growth sectors, a situation similar to that of Nigeria. Jalilian et al. (2009) pointed out that the indirect impact of the global financial crisis was more severe than the direct impact. The crisis led to a sharp decline in the

¹ Organisation for Economic Co-operation and Development's Development Assistance Committee (OECD-DAC) European Union (EU) donor countries Official Development Assistance (ODA) disbursements to the Less Developed Countries (LDCs).

garments industry and mass layoffs of workers, a leading economic sector accounting for 65.0% of total exports. Monthly exports fell by as much as 50.0%, from US\$250 million in 2008 to \$100 million in January 2009, on average, while 51,000 workers were laid off (of the 350,000 workers in the industry). Other impacts were evident in the slowdown in tourism, reduction in construction activities and demand in the real estate market, as well as a fall in agricultural commodity prices due to no markets at all as world conditions changed.

Other authors investigated the impact of the global financial crisis on advanced countries and emerging markets. They noted that linkages in trade and financial exposure was a major determinant of the heterogeneity of growth performances across countries during the crisis (Berglof et al., 2009; Ghosh et al., 2009; IMF, 2009a, 2010; Blanchard et al., 2010; Rose and Spiegel, 2010, 2011; Lane and Milesi-Ferretti, 2011; Berkmen et al., 2012). Furthermore, these studies found that more open countries saw larger growth declines, as the spillover effect of growth declines from trading partner country affected most countries and countries with huge financial exposures also had large growth declines.

Kassim (2012) examine the integration among the Malaysian, U.S. and Japan stock markets during the global financial crisis by assessing how international financial shocks are transmitted through the global stock markets. The author found that the nature of integration changed and all the markets operated independently as investors opted for other types of investment than the equity markets. Caputo et al. (2011) investigated the effects of the global financial crisis on the Chilean economy and found that the crisis negatively impacted the Chilean economy through the spread differential, the country risk premium and foreign output shocks.

Dell'Ariccia et al. (2011) used a 40-country sample to assess the impact of the 2007/2008 crisis and found that 21 of the countries with 'twin booms' in real estate and credit markets suffered either a crisis or a huge drop in GDP growth rate,

compared with the country's performance between 2003 - 2007. Also, 11 out of the 40 countries suffered both financial sector damage and a sharp drop in economic activity. Also, Calomiris et al. (2010) examined stock returns during the 2007-2008 global financial crisis and identified: the collapse of global demand, the contraction of credit supply, and selling pressure on firms' equity as the three crises 'shock factors' that had large and statistically significant influences on residual equity returns during the crisis period.

Chitiga et al. (2009) in evaluating how the international crisis affected the South African economy found that government account was impacted negatively through the slow global growth, while some of the gains made by the government before the crisis were reversed. The study of Headey et al. (2010) also noted that the crisis led to increased poverty and food insecurity, while assessing the impacts of the financial crisis on developing countries. Diao et al. (2012) assessed the impact of the recent financial crisis on China's economic growth and their results showed that GDP growth rate fell to 2.9% in 2009 due to the sharp drop in exports of manufactured goods. Barajas et al., (2010) assessing African countries GDP via the remittance channel, with respect to the impact of the global economic crisis, asserted that remittance dropped by 3.0 and 14.0 percentage points, with migrants in Europe receiving the hardest hit.

In the case of Nigeria, the financial and stock market were not spared. Following the initial relative insulation, the speed of contagion and response was comparatively slow. The effects, however, started to be visible from the first quarter of 2008 when various market indicators around the world stock market and Nigeria plunged, giving rise to a negative market growth (Sere-Ejembi, 2008). Alege et al. (2012) assessed the impact of the global financial crisis on the Nigerian economy for period 1970 – 2010 and found that the crisis impacted Nigeria through financial and trade links, remittances and other capital flows. This result was similar to that of Roitman (2009), who stated that the crisis impacted on the central government

through revenue in terms of reduced corporate taxes, income tax and VAT, decrease in royalties and mining taxes, low import taxes and capital income.

Ajakaiye and Fakiyesi (2009) and Amba (2011) in their study noted that the global financial crisis affected Nigeria through the fall in oil exports. That the negative oil price shock impacted negatively on macroeconomic variables, poverty and household welfare in Nigeria. Nkoro and Uko (2012) examine the impact of the financial crisis on the Nigeria economy with respect to market capitalisation, commodity prices, exchange rate, foreign direct investment, trade flows etc. They found that the crisis affected all the drivers of Nigeria's growth: prices and demand for primary commodities, capital flows, especially foreign direct investment. Alege et al. (2012) also found that the global financial crisis impacted the Nigerian economy through financial and trade links, remittances and other capital flows, making the economy unstable.

Hemen et al. (2014) in their study attempted to answer the question of whether the recent 2007/2008 financial crisis affected economic growth, consumption and investment in the Nigerian economy. Their result showed that the crisis negatively affected economic growth, consumption and investment in Nigeria. Ajao and Festus (2011) were able to establish that economic activities during the global financial meltdown were adversely affected and this impacted negatively on financial deepening in the economy. Olaniyi and Olabisi (2011) in their study showed that the global financial crisis negatively affected the performance of Nigerian banks, notwithstanding the high liquidity in the banking system immediately after the 2005 banking sector consolidation exercise. The findings of Yakubu and Akerele (2012) was seemingly different from the majority of findings on the impact of the global financial crisis on the Nigerian economy. Their result from analysing the impact of the global financial crisis on the Nigerian stock exchange showed that the global financial crisis did not cause any significant distortions in the Nigerian stock market.

Asaju et al. (2013) noted that the financial crisis which led to a decrease in crude oil sales and increases in commodities import prices into the country, resulted in a sharp fall in the country's revenue profile with severe implications for infrastructural and technological development, industrial growth, and the achievement of the Vision 20: 2020 objectives. They also noted that the situation was further exacerbated by the high social challenges of unemployment, poverty and corruption. Ngwube and Ogbuagu (2014) also established that the global financial crisis which had severe implications on oil price (with particular reference to the bonny light), negatively affected the All Share Index (ASI) of the Nigerian stock market. While assessing the impact of the global financial crisis on oil revenue in Nigeria, Bitrus (2011) reported that oil revenue in Nigeria was significantly affected by the financial crisis. Sanusi (2010a & b) noted that the global financial meltdown affected Nigeria through both the financial and real (trade, remittances and aid) channels. These channels were: declining crude oil price and revenue; declining foreign exchange earnings/export receipts and capital inflow; as well as increased capital outflow (divestment of portfolio investments from the capital market) and the withdrawals of credit lines to Nigerian banks. Sanusi also stated that banks' assets deteriorated sharply as a result of the crisis and the Nigerian banking sector was thrown into severe chaos as many banks became distressed.

Igbatayo (2011) also showed that the financial market in Nigeria was severely undermined during the global financial crisis, as there was a credit squeeze, loss of confidence and financial contagion that almost paralysed the banking system and capital markets. Ashamu and Abiola (2012) also investigated the impact of the global financial crisis on the Nigerian banking sector. The result of their findings revealed that the crisis caused a depression in the Nigerian capital market and a decline in the amount of credit extended by banks for trading in the capital market. Also, it led to liquidity tightening, higher loan-loss provisioning, the decline in banks' balance sheet and decreased profitability. On the contrary Jenrola and Daisi (2012) opined that the downturn in the Nigerian Stock market was not attributed to the global financial crisis, rather, to the instability in the macroeconomic environment in

Nigeria. Later studies by Mohammed and Mohammed (2013), testing the residual effect of the impact of the financial crisis in a developing economy (Nigeria), concluded that there still exist some residual impacts of the financial crisis on economic growth in Nigeria.

2.7.2 External Shocks and Economic Performance

External shocks have been noted to produce significant changes within the economy. These shocks are unpredictable and typically impact various facets of markets, sectors and the economy. External shocks have been adjudged to come in a variety of forms. They can come in the form of technological, oil price, fiscal, monetary, terms of trade, investments, exchange rate, interest rate, capital flows (sudden stops), currency devaluation shocks, etc. Previous literature has shed light on the relationship between external shocks and various aspects of the economy, but their findings remain mixed with divergences of views on the issue. Some studies claim the existence of either a positive or negative relationship and try to provide explanations for their findings. Others try to refute the claim of a positive relationship between external shocks and the economy. Notwithstanding these findings, the review of empirical studies below will guide the expectations of the relationships or impacts.

Consequently, while evaluating the role of external factors in most Latin American countries during the 1990s, Calvo et al. (1993) noted that capital was flowing to most of the Latin American countries despite wide differences in macroeconomic policies and economic performance across countries in the region. They also pointed out that domestic reforms alone could not possibly explain the renewal of capital inflows to the region, while suggesting that external factors were playing a large role. Using a sample of 10 Latin American countries for their estimate, they concluded that as much as 50.0% of the behaviour of capital inflows to and real exchange rate in the region in the early 1990s was accounted for by external factors. This claim was further supported by (Calvo and Reinhart, 2000; Canova, 2005).

The study of Calvo et al. (1993) motivated Izquierdo et al. (2008) to analyze the relevance of external factors in the average quarterly GDP growth for 1990-2006 in the seven largest Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela), which they called LAC7. They found that external factors accounted for a significant share of the variance in LAC7 GDP growth and that external shocks produced significant responses. Österholm and Zettelmeyer (2007) investigated the sensitivity of Latin American GDP growth to external developments. They found that external shocks - financing, external growth and commodity price - explain more than half of the variance of the growth of the aggregate Latin American output index at standard medium-term horizons (depending on the model, the number varies between 50.0% and 60.0%). Of these shocks, financing shocks turned out to be the most important, explaining over half of the contribution of external shocks.

Sosa and Cashin (2013) analyse how exogenous factors affect business cycles in the Eastern Caribbean. They found that altogether; external shocks - climatic, oil price, external demand, and world real interest rate shocks - play a key role in explaining more than half of the macroeconomic fluctuations in the region. They note that domestic business cycles are especially vulnerable to changes in climatic conditions, with a natural disaster leading to an immediate and significant fall in output - but the effects do not appear to be persistent. Oil price and external demand shocks also contribute significantly to domestic macroeconomic fluctuations. Caputo et al. (2011) used a DSGE model for investigating the effects of the global financial crisis on the Chilean economy. They incorporated domestic spread and country risk premium shocks, as financial restrictions, and found that the slump in the Chilean economy in 2008 and 2009 was caused by the spread differential, the country risk premium and foreign output shocks (foreign shocks).

Monacelli and Sala (2009) analysed the contribution of common international factors to the dynamics of price inflation rates of a cross-section of 948 CPI

products in four OECD countries (France, Germany, United Kingdom, United States). They found that, on the average, one international factor explained 15.0% - 30.0% of the total variance depending on the exact form of the price index (monthly versus annual change) and the transformation applied to the data. They also found a significant relationship between the importance of international factors and trade openness, and a strong positive and statistically significant relationship between exposure of consumer inflation to international shocks and trade openness at the sectoral levels. They noted that the latter result holds regardless of whether the original data are expressed in local as opposed to common currency. Other studies also supported the above impact of shocks on prices: Krznar and Kunovac (2010) affirmed that producer and consumer price indices in Croatia were affected by changes in external factors like change in world prices, while Gerlach-Kristen (2006) also showed that the swings in output in the economy of Hong Kong were attributed to some key domestic and external factors.

Aarle and Sosoian (2010) in their study of the Armenian economy focused on the possible effects of shocks to remittances, exchange rate, oil price, the risk premium on Armenian assets and government consumption using out-of-sample simulations of the model. In the model, imports increase, real output growth declines and price and wage inflation rise because of the higher oil price. Their simulation found a direct impact of remittance on the Armenian economy and a series of channels that it contributes to it. They further found that the increase in the oil price is a shift factor in imports. Cabezon (2012) assessed the effects of foreign financial shocks on the Chilean economy using both real and financial variables. He found that shocks in the volatility of foreign stock markets negatively and significantly affected GDP, while there was a fall in the domestic interest rate and depreciation of the Chilean currency because of the shock.

Rautava (2004) investigated the impact of international oil prices and the real exchange rate on the Russian economy and its fiscal policy. He found that the Russian economy is influenced significantly by fluctuations in oil prices and the real

exchange rate through both long-run equilibrium conditions and short-run direct impacts. In the long run a 10.0% permanent increase (decrease) in international oil prices is associated with a 2.2% growth (fall) in the level of Russian GDP, while a 10.0% real appreciation (depreciation) of the rouble is associated with a 2.4% decline (increase) in the level of output with significant short-run effects. He concluded that international energy (oil) price volatility impacts on both the Russian domestic currency (rouble) and economic activities. Kaminsky and Reinhart (1999) in their study found that foreign banks propagated shocks across national borders during the 1997 Asian crisis. The reversal of credit lines by Japanese and European banks, which were the major lenders to emerging Asia increased the spread and amplified the crisis throughout the region. Brown and Yücel (1999) captured the impact of the oil sector and the rest of the economy in their study when they found that high energy prices, arising from an oil price shock, shifts the production function temporarily and results in lower output.

Eltony and Al-Awadi (2001) examine the impact of oil price fluctuations on seven key macroeconomic variables for the Kuwaiti economy, using a vector autoregression model (VAR) and a vector error correction model (VECM). Applying the two methodologies on quarterly data for the period 1984:1-1998:4, they found that, theoretically and empirically, the VECM is superior to the VAR approach. Also, the results corresponding to the VECM model are closer to common sense. The empirical results highlight the causality running from the oil prices and oil revenues to government development and current expenditure and then towards other variables. The most striking result is that a government fiscal stimulus is the main determinant of domestic prices, while monetary stimuli have the least results. The policy implication of this is that fiscal policy can be used more effectively to stabilise the domestic economy after an oil shock.

Papageorgiou et al. (2011) investigated the short-run effects of the 2007-09 global financial crisis on the growth of non-fuel exporting, low-income countries (LICs). They found that the sharp growth declines were attributed to the magnitude of the

external shocks which they faced over the period, particularly, shocks to external demand. Raddatz (2008a) had similar results in his study which showed that higher volatility of external shocks in Latin America was responsible for its higher output volatility relative to East Asia and Pacific, Western Europe, or High-Income countries. Marion et al. (2009) analysed how country-specific shocks of income volatility impact on open economies and found that country-specific shocks has a significant and positive impact on GDP volatility. Also, the extent of the linkage between different trading partners amplifies the degree of exporters' GDP volatility than the volatility of demand in the individual export market.

In economic literature, it has been shown that trade is central in explaining economic fluctuations in many developing countries. Also, terms of trade volatility affect countries income volatility through openness and trade openness, which may expose economies to external shocks (Rodrik, 2001; Calderon et al., 2005). It is on this grounds that studies like Easterly et al. (2001) and Calderon et al. (2005) find that increased growth volatility is explained by higher trade openness. However, Kose and Riezman (2001) do not find that trade openness has a robust effect on GDP volatility. Other studies considered output volatility in partner countries as a source or measure of external shock in determining domestic volatility. They found that output volatility in partner countries had a positive effect on exporters' GDP volatility (Ahmed, 2003; Calderon et al., 2005; Bacchetta et al., 2009). Zhu (2010) investigated the impact of external shocks on domestic policy responses in less developed countries (LDCs), and how measures of policy response differentiated national economic performances. He adopted export penetration as the most significant variable producing external shocks. The main drive of the study was to empirically show that the degree of success achieved in an economy is defined by shocks and policies attributable to global economic interactions. His findings showed a positive result for the LDCs, as the extent of adverse shocks faced by these economies and the measure of export penetration was suggested as predictors of economic success for the LDCs.

Trade provides avenues for countries to expand their growth opportunities but also exposes them to external shocks. Several studies have assessed the relationship between terms of trade shocks and changes in GDP growth. Ahmed (2003); Broda (2004) and Raddatz (2007) studied the sources of short-term fluctuations in output; they found that changes in terms of trade shocks explain real output volatility. Mendoza (1995) and Kose (2002) noted in their study that terms of trade shocks in most developing countries are largely exogenous and that movements in terms of trade account for roughly half of the output volatility in these countries. Broda and Tille (2003) also noted that sharp swings in a developing country's terms of trade seriously disrupt output growth. In cross-country studies and looking at the same relationship, several studies found a positive relationship between terms of trade volatility and GDP (income) volatility (Hausman and Gavin, 1996; Rodrik, 1998, 2001; Easterly and Kraay, 2000; Giovanni and Levchenko, 2008). Several other studies also dealt with how shocks are transmitted in the global economy and the impact of these shocks on growth in developing countries, particular terms of trade shocks (Easterly et al., 1993; Collier and Gunning, 1999; Deaton, 1999; Helbling et al., 2007; Ndulu and O'Connell, 2007; Raddatz, 2007).

Nguyen et al. (2014) investigate the role of external shocks in macroeconomic fluctuations of seven (7) East Asian countries during the period 2001–2012. They looked at shocks which originated from the global economy as well as from the U.S. They found that oil prices and U.S. monetary shocks are key in explaining the variations in domestic variables. Also, domestic variables are highly symmetric when these external shocks occur. Similarly, Raddatz (2008b) investigated the sources of macroeconomic fluctuations in a sample of 38 African countries during 1963-1989 and 1990- 2003, using external and internal shocks. He found that in the last 15 years, external shocks have gained more importance as sources of output instability in African countries. He further noted that this increased importance of external shocks is due to two factors: a decline in the variance of internal shocks and an increase in the vulnerability of output to external shocks.

Galesi and Lombardi (2009) assessed the extent to which oil and food price shocks transmit to the inflationary outlook and the real economy of a given set of countries. They found that the direct inflationary effect of both oil and food price shocks affect mostly developed countries. The food price effect was more for emerging economies, while the oil price effect had less sizeable effects. Akıncı (2013) investigated the extent to which global financial conditions contribute to macroeconomic fluctuations in emerging countries. He used a global risk-free interest rate, global financial risk, and country spreads as a measure of global financial conditions. The results of the study showed that the global financial risk shocks explain 20.0% of movements in both the country spread and the aggregate activity in emerging economies. Also, while country spread shocks explain about 15.0% of the macroeconomic fluctuations in emerging economies, the contribution of global risk-free interest rate shocks was negligible.

Ng (2002) also found that there was a higher correlation of domestic responses to external shocks for five SouthEast Asian countries over the period 1971–1995. Similarly, Huang and Guo (2006) reported that in most Asian countries, the impact of external shocks was significant and also resulted in symmetric responses in the considered countries. Ruffer et al. (2007) support claims by the above studies when they showed that external developments largely drive developments in Asian emerging economies. Still, on the impact of external shocks, Allegret et al. (2012) reported that external shocks had played an important role in East Asian economies since the 1990s, while Mackowiak (2007) asserted that external shocks drive macroeconomic fluctuations in emerging markets. Hussain and Gunter (2005) in their study found that terms of trade shocks counter-balanced the positive effects of the 18 Heavily Indebted Poor Countries (HIPCs) debt relief in Africa. The economic growth in these countries which had grown by an average of 2.9% per annum, had been lowered to an average of 2.0% per annum, while poverty also increased by an average of 1.3% per annum.

It is worthy to note that external shocks do not work in an economy in isolation, rather they interact with domestic economic conditions (domestic macroeconomic policies) such as fiscal and monetary policies. These domestic macroeconomic policies play a key role in the macroeconomic adjustment to external shocks in open economies. In the U.S. there have been many studies on the effect of total government spending on output (Blanchard and Perotti, 2002; Canzoneri et al., 2002; Carstensen et al., 2005; Favero and Giavazzi, 2007; Burriel et al., 2009). All these studies employed the VAR methodology and found that an expansion of total government spending had positive effects on output. Their impact multipliers were less than 1 (0.8 for Blanchard and Perotti (2002); 0.76 for Burriel et al. (2009) and 0.98 for Canzoneri et al. (2002)). Furthermore, their peak multipliers were mostly nearly 1 (1.3 for Blanchard and Perotti (2002) at the 15th quarter; 0.76 for Burriel et al. (2009) at the 1st quarter; and 1 for Canzoneri et al. (2002) at the 3rd quarter). After the peak point, the multipliers declined consistently, with crowding out from either interest rates or prices, except for Blanchard and Perotti (2002), where interest rates and prices were not included.

Similarly, Badinger (2006); Burriel et al. (2009); De Castro and De Cos (2006); Giordano et al. (2007); Heppke-Falk et al. (2006) and Perotti (2002) studied the effect of fiscal policy in Austria, the Euro area, Spain, Italy, Germany, and five OECD countries, respectively. All these studies employed the VAR methodology and found that an increase in total government spending had a positive effect on output, although this was insignificant in the case of Heppke-Falk et al. (2006). Most of their impact multipliers were less than 1 (0.53 for Badinger (2006); 0.75 for Burriel et al. (2009) and 0.2 for Giordano et al. (2007)). This ranged from low multipliers in the U.K. and Australia, at 0.3, to a high multiplier of 1.3 in Germany for Perotti (2002). Also, their peak multipliers were mostly less than 1, and by the fourth quarter, the multipliers declined consistently with the crowding out from interest rates and prices.

Also, there has been research on the effects of fiscal policy in Asian countries. Kuttner and Posen (2002) and Walker (2002) studied the impact of government spending in Japan using a VAR and with non-linear VAR, respectively. Both found a positive multiplier; i.e. the peak multiplier found by Walker (2002) was 1.67 in the second quarter, while the cumulative multiplier over four years found by Kuttner and Posen (2002) was 3.5. In contrast, a negative effect on output from an increase in government wages (a part of current spending) was found in both the U.S. and Euro areas (Arin and Koray, 2005; De Castro and De Cos, 2006). Similarly, many studies found that an increase in total government spending crowded out private investment, which would eventually negatively affect output: Alesina et al. (2002) - 18 OECD countries; Blanchard and Perotti (2002), Mountford and Uhlig (2005), and Bouakez and Rebei (2007) - the U.S.; and Afonso and Aubyn (2008) - the U.S., France, Japan and Italy. Chang et al. (2002) in their study concluded that fiscal policy could not promote the economy. They used data from 1951 to 1995 for Thailand and found that over ten years the cumulative multipliers for taxes and government spending were both just 0.04, and not significant. On the other hand, Nidhiprabha (2010) used the VAR to investigate the macroeconomic policy in Thailand from July 1997 to September 2001 and found that monetary policy seemed to be more effective than fiscal policy. However, the author noted that changes in monetary policy affected inflation more than changes in fiscal policy.

Chuku (2009) traced the effects of monetary policy shocks on output and prices in Nigeria using three alternative policy instruments of broad money (M2), Minimum Rediscount Rate (MRR) and the real effective exchange rate (REER). The author found that monetary policy innovations transmitted through the quantity-based nominal anchor (M2) has modest effects on output and prices, while innovations on the price-based nominal anchors (MRR and REER) have neutral and fleeting effects on output. Edoumiekumo, et al. (2013) examined the responsiveness of real sector output to monetary policy shocks in Nigeria. The study revealed that the monetary policy rate and interest rate had no instantaneous and direct impact on

real sector development (GDP), but indirectly through the credit and investment channels. Apere and Karimo (2015) investigated the transmission channel of monetary policy shocks to agricultural output growth and found that monetary policy shocks (as measured by the interest rate) have a dominant impact on agricultural output growth in Nigeria. Also, they found that monetary policy shocks transmitted through the interest rate channel were more effective. In contrary, Apere and Karimo (2014) examined the effectiveness of monetary policy on economic growth and inflation in Nigeria. The estimation result showed that monetary policy variables might not have an instantaneous impact on output, but are key determinants of output growth in the long-run.

In Nigeria, some studies have been conducted to assess the impact of external shocks on the economy. While examining the effectiveness of both fiscal and monetary policies in mitigating external shocks on the Nigerian economy, Saibu and Apanisile (2013) found that external shocks have hindered the effectiveness of domestic policies over time. Ayadi et al. (2000) in their study assessed the effects of oil production shocks on the Nigerian economy over the period 1975-1992. The result reveals that the energy sector exerts a significant influence on the Nigerian economy by acting as a prime mover. More importantly, Nigeria seems to find itself in a vicious circle, because of its inability to exercise control over the price of its main export and its imports. Their result further showed that the impact response of output is $< 1/5^{\text{th}}$ of that of oil production, but the response of output after a year is slightly larger than that of oil production. However, they observed that the response of inflation to a positive oil production shock was negative. They concluded that in the face of a positive oil price shock on the economy, output would increase while inflation will decrease, and the national currency will depreciate.

Alege et al. (2012) tested the hypothesis, whether the global financial crisis impacted the Nigeria economy through global shocks. They found that global shocks made Nigeria unstable, affecting the country through financial and trade links, remittances and other capital flows. Ajakaiye and Fakiyesi (2009) and Amba

(2011) examined the impact of the global financial crisis on Nigeria in the face of international crude oil price shocks. They found that the negative oil price shock increased the poverty level and worsened household welfare throughout the crisis. Saibu and Apanisile (2013) examined the effectiveness of macroeconomic policies in Nigeria in mitigating the negative impact of external shocks and found that external shocks had hindered the effectiveness of domestic policy over time. Yusuf (2015) examined the impact of oil price shocks and unrest in the international crude oil market on Nigeria's economic growth. His findings showed that applying oil price shock and unrest to Nigeria's economic growth provides useful information in predicting the future path of economic growth in Nigeria.

Adeniyi et al. (2011) acknowledge the fact that the examination of the impact of oil price shocks on the economy had taken centre stage in research for almost four decades. They joined the vast majority of studies in looking at the impact of oil price shocks on economic growth in Nigeria by exploring alternative measures of oil price shocks. This alternative measure was derived using a number of non-linear transformations, which capture the key aspects of the departure of the oil price-output interaction from the standard linear view. They did this in an attempt to ascertain the extent to which the definition of the shocks adopted affected the conclusions about the oil price-growth association. Their finding was different from the popular opinion that oil price shocks have a significant impact on economic growth in Nigeria. Their result showed that oil price shocks do not account for a significant proportion of observed movements in macroeconomic aggregates, despite the introduction of threshold effects into the linkage between oil price shocks and output growth in Nigeria. Omojolaibi (2013) supported the above finding when he examined the effects of crude oil price changes on economic activity in an oil-dependent economy - Nigeria. His result suggested that domestic shocks were to be blamed for the perceived behaviour of economic activities in the economy, and not oil price variations which are driven mostly by oil shocks. Ekesiobi et al. (2016) on the other hand found that external shocks exert substantial pressure and uncertainty on government revenue in Nigeria, while

investigating the empirical relationship between external shocks and government revenue in Nigeria.

Arodoye and Iyoha (2014) examined the nexus between foreign trade and economic growth in Nigeria and found that own shocks and foreign trade innovations were largely the predominant sources of variations in Nigeria's economic growth. Alimi and Atanda (2011) in their study also joined the body of literature that found a positive link between economic growth in Nigeria and external developments. They investigated the effect of globalisation on economic growth in Nigeria, accounting for cyclical fluctuations in foreign investments. They found that globalisation has a positive and significant effect on economic growth in Nigeria. Also, they found that the external reserves act as a shield to the economy from external shocks, while international relative prices stabilise the growth rate of real output. Aliyu (2009) also showed that oil price shock and exchange rate appreciation exerted a positive impact on real economic growth in Nigeria. Iklaga and Evbuomwan (2012) also found that external shocks (particularly oil prices) considerably impact major macroeconomic variables in Nigeria (output, inflation, money supply and exchange rate), given the high dependency of the economy on crude oil.

Joining some other studies with similar results, Audu et al. (2015) while investigating the impact of crude oil price shocks on a host of macroeconomic variables in Nigeria found that oil price shocks did not constitute any significant inflationary threat to the economy in the short-run. Rather, it enhanced the performance of the gross domestic product and money supply. However, it impacted negatively on external reserves and international trade as a result of the fall in oil price. Akinleye and Ekpo (2013) also join the vast literature on the evaluation of external shocks on the Nigerian economy when they examined the symmetric and asymmetric oil price and oil revenue shock on macroeconomic performance in Nigeria. Their finding suggested that, in the long-run, both positive and negative oil price shocks influence real government expenditure via external

reserves. Also, they found that positive oil price shocks can trigger inflationary pressure and domestic currency depreciation as importation rises, through its strong short and long-run effects on real GDP. On the other hand, the results also showed that in the long-run, oil revenue shocks could hinder economic growth, while increasing the general price level in the short-run.

Ezema and Amakom (2011) showed that terms of trade shocks have negatively impacted Nigeria's macroeconomic performance. Ojapinwa and Ejumedia (2012) having examined the impact of oil price shocks on industrial output in Nigeria concluded that oil price shocks, inflation and exchange rate cause significant movements in industrial output in Nigeria. Umar and Kilishi (2010) in their study of the impact of oil price shocks and the Nigeria economy found that oil prices cause huge distortions in real GDP, money supply and unemployment, with no significant effect on the consumer price index. Omisakin (2008) also showed that oil price shocks significantly accounts for the variations in oil revenue and output, while having no meaningful effect on money supply, the price level and government expenditure in Nigeria (a result similar to that of Umar and Kilishi (2010)). The findings of Alley et al. (2014) was quite different from the majority of studies that found a significant impact of oil price shocks on Nigeria's economic growth. They found that oil price shocks had an insignificant impact on economic growth, but rather, economic growth is significantly improved by oil price. However, they noted that the negative effect of oil price shocks arises from the uncertainty it creates and the extent to which it undermines the effectiveness of managing the proceeds from crude oil.

A critical assessment of past and current studies on the impact of external shocks on the Nigerian economy reveal that most of these studies did not contextualise the evaluation of the impact of the referenced shock variable. Secondly, most of the studies concentrated only on the impact of a single shock variable at a time or at most two. A majority of these studies concentrated majorly on the impact of oil price shocks on the Nigerian economy, given the high dependency of the economy

on crude oil. Thirdly, some of the methodologies used in some of the studies could not effectively measure the impact of the shock on the variable of interest. These gaps make it difficult to generalise the impact of these shocks throughout the whole phases that the economy has gone through and to properly situate the impact of these shocks at various points in time in the economic journey of the country. Lastly, most of these studies did not effectively and specifically address the importance of considering these shocks during policy design and implementation.

2.7.3 Methodological Approaches to Impact Studies on External Shocks

This section reviews the different methodological approaches used to measure or capture the impact of external shocks on the various macroeconomic variables that interplay within the economy. This review is based on existing empirical literature with a view of showcasing the various methodologies, so as to guide this study in the selection of the appropriate methodology to adopt. Estimating the impact of external shocks on the economy has been an onerous task because measuring or capturing the relationship. This kind of relationship depends on several issues, such as the variable in mind that is propagating the shock, the type of methodology applied, the data to be tested, the economic variable the shock is impacting on, and most of all the operating economy.

According to literature, several studies have used the vector autoregressive (VAR) methodology to evaluate the impact of shocks. Amongst such studies are Cabezón (2012), who constructed a vector autoregressive (VAR) model for the Chilean economy to assess the effects of foreign financial shocks on the Chilean economy. Aly and Strazicich (2011) tested several North African countries for evidence of an adverse impact on their economic growth following the 2007-2009 global financial crisis and recession, using a VAR model. Rautava (2004) used the VAR modelling and cointegration techniques to assess the impact of international oil prices and the real exchange rate on the Russian economy. In like manner, Canova (2005)

using an unrestricted VAR studied whether and how U.S. shocks are transmitted to eight Latin American countries.

Kassim (2013) also adopted a VAR methodology to ascertain the evidence of global financial shocks transmission on the changing nature of the Malaysian stock markets integration with the U.S. and Japan stock markets during the 2007/2008 financial crisis. Galesi and Lombardi (2009) used a generalised vector autoregressive (GVAR) model to assess the extent to which oil and food price shocks are transmitted to the inflationary outlook and the real economy of a given set of countries. Similarly, Akıncı (2013) investigated the extent to which global financial conditions contribute to macroeconomic fluctuations in emerging countries using a panel structural VAR - another variant of the VAR.

Sosa and Cashin (2013) developed a country-specific VAR model with block exogeneity restrictions to examine how exogenous factors (climatic and external shocks) contribute to macroeconomic fluctuations in the Eastern Caribbean. Nguyen et al. (2014) using a structural VAR model for 7 East Asian countries investigated the role of external shocks emanating from the U.S. and the global economy in macroeconomic fluctuations of the East Asian countries during the period 2001–2012. Krznar and Kunovac (2010) reported how changes in external factors such as world prices affect producer and consumer price indices in Croatia using a VAR model. Similarly, Gerlach-Kristen (2006) used a VAR model to assess the impact of key domestic and external factors on output in Hong Kong. Several authors such as Ng (2002); Huang and Guo (2006); Mackowiak (2007); Ruffer et al. (2007) and Allegret et al. (2012) investigated the impact of external shocks on Asian and emerging market economies using a structural VAR model.

Ayadi et al. (2000) used a VAR model in their study to assess the effect of oil production shocks on the Nigeria economy over the period 1975-1992. Alege et al. (2012) also constructed a five variable VAR model of the Nigeria economy to test the hypothesis that the global financial crisis does not impact on the Nigerian

economy. Jawadi et al. (2010) used a structural vector autoregressive (SVAR) model to apprehend the Nigerian stock market reactions to central bank policies during the financial crisis. Yusuf (2015) examined the impact of oil price shocks on Nigeria's economic growth for the period 1970-2011, using an SVAR model. Adeniyi et al. (2011) used a multivariate threshold autoregressive model, together with the IRF and VDC from the VAR to evaluate the impact of oil price shocks on economic growth in Nigeria, while exploring alternative measures of oil price shocks.

Omojolaibi (2013) studied the effects of crude oil price changes on economic activity in an oil-dependent economy – Nigeria, using a small open economy structural vector autoregressive (SVAR) model. Arodoye and Iyoha (2014) used a VAR model to fully account for feedbacks when they examined the nexus between foreign trade and economic growth in Nigeria. Aliyu (2009) assessed the impact of oil price shock and real exchange rate volatility on real economic growth in Nigeria using a VAR. Also, Iklaga and Evbuomwan (2012) conducted an impact study of oil price shocks on oil-rich economies like Nigeria using a structural VAR approach. Audu et al. (2015) modelled the impact of crude oil price shocks on some macroeconomic variables (exchange rate, external reserves, gross domestic product, inflation rate, international trade and money supply) in Nigeria using GARCH and VAR models. Furthermore, Omisakin (2008), Umar and Kilishi (2010), Ojapinwa and Ejumedia (2012), Akinleye and Ekpo (2013), also join the vast literature in assessing oil price shocks and macroeconomic performance in Nigeria using a VAR model.

Several other studies, as identified in the literature, used other methodological approaches outside of the VAR to assess the impacts of various forms of shock on the variables of interest. Kassim (2013) adopted an auto-regressive distributed Lag (ADL) model and a multivariate vector error correction model (VECM) to determine the impact of the 2007 global financial crisis on the integration of the Islamic stock markets. Izquierdo et al. (2008) assessed the role of external factors in the booms

and busts in Latin America using a restricted VECM for an index that captures output behaviour of the typical Latin American country.

Hemen et al. (2014) used an ordinary least squares (OLS) instrumental variable regression with dummy effects to evaluate the impact of the 2007/2008 global financial crisis economic growth, consumption and investment in Nigeria. Saibu and Apanisile (2013) in their study applied an autoregressive distributed lag (ADL) model to measure how effective fiscal and monetary policies in Nigeria have been able to mitigate the adverse effects of external shocks. Ekesiobi et al. (2016) used a cointegration approach and an error correction model (ECM) to investigate the empirical relationship between external shocks and government revenue in Nigeria. Alimi and Atanda (2011) employed an autoregressive model to investigate the effect of globalisation on economic growth in Nigeria for the period 1970 and 2010 taking into account cyclical fluctuations in foreign investments. Alley et al. (2014) used a generalised method of moments (GMM) to investigate the impact of oil price shocks on Nigeria's economic growth.

From the review above, the VAR methodology seems to have been widely adopted by most studies in assessing the impact of a shock on macroeconomic variables. The VAR allows us to measure or assess the magnitude of the fluctuations in the variable of interest which are driven by the shock variable. An a-priori distinction between exogenous and endogenous variables is not a prerequisite in the VAR, because this distinction has been adjudged to be subjective, hence, the need to treat similarly (Sims, 1980). Sims (1980) notes that this is done by looking at the combined effect of the volatility of the response of the variable of interest to innovations in the shocks over a given horizon. Also, the problem of misspecification is avoided in this methodology since the technique sets no restrictions with respect to the structural relationships. In many studies today, the interest in studying the time-varying coefficient VAR models have greatly increased (Sims and Zha, 2002; Cogley and Sargent, 2005).

The VAR analysis is generally most suitable in the evaluation of the functioning of large-scale macroeconomic models. According to Maddala (1992) in the analysis of the interrelationship between macroeconomic time series variables, the VAR model seems to be a strong critical starting point. Also, Darnell and Evans (1990) note that in producing forecasts that are not influenced by how the variables in the model impact others, the VAR models offer a more simple and direct method. The VAR methodology is categorised into two parts: the impulse response function (IRF) and the variance decomposition (VDC). The IRF involves each variable in the model being expressed as a function of its current, lagged values and an error term. The analysis of the IRF allows for the dynamic effects of shocks from one variable to all the other variables in the model to be examined (Ayadi et al., 2000). On the other hand, the VDC is a complementary approach to the IRF analysis. In the VDC, the variance of forecast errors in a given variable is assigned to self-shocks, and the same is done to the other variables in the VAR (Brown and Yücel, 1999).

The empirical strategy of the block exogeneity restrictions and the complete exogeneity assumption incorporated in the VAR model have made it quite a popular tool in the literature on external shocks and macroeconomic fluctuations in both developed and developing countries. For example, this approach has been applied to Canada, Australia, Brazil and Korea, New Zealand, Chile, and Mexico by Cushman and Zha (1997); Dungey and Pagan (2000); Hoffmaister and Roldos (2001); Buckle et al. (2002); Franken et al. (2005); and Sosa (2008), respectively. Also, Raddatz (2007); and Osterholm and Zettelmeyer (2008) did the same for low-income and Latin American economies.

From the preceding, the impulse response function and variance decomposition analysis derived from the VAR are relevant and suitable in the analyse of the impact of external shocks on Nigeria's output performance in this study. The variance decomposition analysis is used to quantify the relative contribution of each of the external factors to the variance of the real GDP growth. On the other

hand, the impulse response function analysis will show the reaction of domestic output performance to each of these external shocks. The impulse response function is a more practical approach to assessing how output performance in Nigeria has tended to react to the various shock parameters, taking into account both the direct and indirect effects (the indirect effect through the reaction of the other variables). Also, Sims (1980) suggested the use of the impulse response from the VAR for policy analysis.

The VAR models have become a veritable technique in the hands of researchers as a common tool in empirical macroeconomics. It is used in forecast of macroeconomic conditions and in evaluating the dynamic impact of shock variables, yet it suffers from some drawbacks. One of the problems of the VAR model is the heavy parameterisation, which in longer time horizons, can cause poor forecasting performance. This is because the estimated parameters of the model are the basis for the level at which the forecast converges (Österholm and Zettelmeyer, 2008). Another limitation of the VAR model is that one may get misleading results from the standard methods of statistical inference if there is a high degree of persistence amongst the variables. This is the case when trying to compute the standard errors for impulse responses. Also, standard VARs have been adjudged to miss nonlinearities, drifts/breaks in parameters and conditional heteroskedasticity without modifications (Stock and Watson, 2001). Furthermore, VARs can be unstable when it has only two or three variables, thus making it a poor predictor of the future (Stock and Watson, 1996).

2.8 Summary

This chapter has examined the conceptual and definitional issues around financial crisis, causes and classification of financial crisis, as well as the interaction between financial crisis and business cycle. It has also looked at the 2007/2008 global financial crisis, which has its origin in the subprime mortgage sector in the United States. It has carefully reviewed theoretical models that best explain the recent global financial crisis and how external shocks are transmitted into the

economy through different macroeconomic variables. Also, it outlined previous studies that had tested various forms of shock factors on different macroeconomic variables using the real business cycle theory, and examined the empirical studies on the impact of the financial crisis and external factors on economic performance. Also, the chapter assessed methodologies used in previous impact studies. From the empirical literature reviewed, it becomes evident that there exist divergence of views on the impact of external shocks on the economy, and these issues call for further empirical research. This is prominent in the case of Nigeria, where some of these issues have not been well contextualised or subjected to rigorous empirical investigation. Most of the related studies only concentrate on a single shock factor or at most two, without paying adequate attention to the point in time in the economy and the need to account for these shocks during policy design and implementation.

Chapter Three

The Nigerian Economy and External Shocks Propagated through the Global Financial Crisis

3.1 Introduction

This chapter reviews the Nigerian economy and the various sectors that make up the economy. Having in mind the main objective of this research, which is to assess the impact of external shocks that was propagated through the global financial crisis on Nigeria's output performs. The chapter reviews how external shocks affected the different sectors within the economy through the 2007/2008 global financial crisis, as well as the measures taken by both the government and the apex financial institution (The Central Bank of Nigeria (CBN)) to mitigate the effects of these shocks. This chapter reviews the various sectors because they are key to the economic management of Nigeria, thus evaluating the impact of the shocks that were generated through the financial crisis is important. Also, it is worthy to note that some of the sectors were affected directly, while some were indirectly affected, hence, the chapter will try to highlight this in the overview.

3.2 Overview of the Nigerian Economy

Nigeria is the most populous country in Africa, located on the Western coast of Africa on a land mass of about 923,768.0 square kilometres with an estimated population of over 180 million people as of 2014. The country's land mass stretches from the Gulf of Guinea on the Atlantic coast in the South to as far as the Sahara Desert in the North. The Niger and Chad Republics border Nigeria to the North, the Cameroon Republic to the East, and the Benin Republic to the West (CBN, 2014; NPC and ICT International, 2014). Nigeria is a Federation with different ethnic nationalities, and currently structured into 36 States, a Federal Capital Territory (FCT), 774 Local Government Areas and six (6) Geo-political Zones. These geopolitical zones are based on cultural affiliation, language and contiguity of the states and local government areas. The zones are South-South,

South-West, South-East, North-Central, North-East and North-West (Adeyemi, 2013).

According to EIA (2013), Nigeria was the top liquid fuels producer in the Sub-Saharan Africa (SSA) region, followed by Angola. In 2012, Nigeria and Angola jointly produced up to about 75.0% of the total liquid fuels in SSA. Still, in 2012, Nigeria was ranked the 4th largest Liquefied Natural Gas (LNG) exporter in the world, accounting for about 8.0% of total LNG exports worldwide and exported about 950 billion cubic feet (bcf) of LNG in 2012 (EIA, 2013). The country is endowed with about 182 trillion cubic feet of proved natural gas reserves, which accounts for about 82.0% of the total proven natural gas reserves in SSA. This makes the country the 9th largest holder of proved natural gas reserves in the world (EIA, 2013).

Nigeria has been currently adjudged to be the largest oil producer in Africa, with the second largest proved oil reserves in Africa, next to that of Libya and the world's fourth-largest exporter of LNG in 2015 (WEC, 2013; EIA, 2016). Nigeria has been a member of the Organization of the Petroleum Exporting Countries (OPEC) since 1971. The country's major oil wells are located in the Southern part of the country, in the Niger Delta to be precise, the Gulf of Guinea, Bight of Benin, and the Bight of Bonny (offshore). The greater part of Nigeria's crude oil export is mainly to North America and Western Europe, and the bulk of its refined crude oil product requirements are imported. Most of the country's exploration activities are centred in the deep and ultra-deep offshores and partly in the North-Eastern part of the country, particularly the Chad basin (WEC, 2013).

Agriculture, which is supposed to be the mainstay of the Nigerian economy, has been relegated to the back because of Nigeria's oil and natural gas resources. IMF (2015) notes that export revenue generated from oil and natural gas was almost \$87.0 billion in 2014, accounting for about 58.0% of the country's total government revenue in the same period. The oil and natural gas sector of the Nigerian

economy has been its main source of foreign exchange revenue, constituting more than 95.0% of Nigeria's total exports to the world in 2014 (IMF, 2015; EIA, 2016).

Fluctuations in crude oil price and other major developments in the global oil market, noticeably affect the Nigerian economy because of her heavy dependence on crude oil for her income. According to projections by the IMF, Nigeria earned about \$52.0 billion in 2015 from oil and natural gas exports. This amount was \$35.0 billion less than what was received in 2014, due to the fall in oil prices (IMF, 2015). As part of lessons learned from developments in the global world market (fluctuations in crude oil price), the Nigerian government put in place two fiscal buffers (the Excess Crude Account and the Sovereign Wealth Fund) to cushion any form of negative effect from oil price developments. These buffers (accounts) are to hold in trust any excesses (savings) generated from the increase in oil price above the budget benchmark price used to estimate budgeted revenues. Due to the fall in oil price between 2012 and 2014, the total amount in these funds declined from \$11.0 billion in 2012 to \$2.0 billion in 2014, while the country's gross international reserves stood at \$34.25 billion at the end of 2014 (IMF, 2015; EIA, 2016). The volatility in the global oil market, oil price and other commodity prices have been a major source of shock and instability to the Nigerian economy, with the attendant effect of the recent global financial crisis (Ojo and Boboye, 2012).

3.3 Structure of the Nigerian Economy

The structure of an economy is the institutional framework which determines the forms of resource ownership, production and distribution of goods and services (Okuneye and Ayinde, 2011). Thus, an overview of the structure and the categorisation of the Nigerian economy over the review period will give a better understanding of the degree of vulnerability of the economy, as well as the interrelationship amongst the economic sectors. Understanding the structure of the Nigerian economy is relevant to the study because most national and international shocks and instabilities are usually sector related. Also, any form of crisis or shock in an economy can cause a ripple effect in the economy through the linkages the

various sectors have with each other. Consequently, taking a cursory look at the structure of the Nigerian economy is necessary as the economy is segmented into sectors so as to capture all the economic activities taking place within the economy.

Rosenberg (2015) asserts that most national economies are categorised into sectors, which shows the proportion of the active population that is effectively engaged in the sectors. Similarly, Gee (2013) pictures a nation's economy as consisting of interrelated economic systems that bring together the factors of production (labor, capital and land resources), as well as the various economic agents who harness these resources efficiently during production, exchange, distribution and consumption of goods and services in the nation. In line with the above assertions, Kenessey (1987) and Rosenberg (2015) identified three main sectors as being the major categorisations of a typical economy: the primary, secondary and tertiary sectors. According to Kenessey (1987) and Rosenberg (2015), the primary sector is concerned with the use of the nation's natural resources to generate wealth. They noted that for developing countries, this sector is very important, unlike in developed countries. For a country like Nigeria, the primary sector is made up of the agriculture (crop production, livestock, forestry, fishing), mining and quarrying (solid minerals, oil and gas) sectors.

On the other hand, the secondary sector (which can be understood as the industrial sector) transforms the output of the primary sector into finished (processed) goods. Rosenberg (2015) mentions a few of the activities within this sector, noting that the sector can be quite elaborate, depending on the size of the economy: building and construction, manufacturing, metal works, automobile production, textile production, chemical production, energy utilities, breweries and bottlers, etc. Also, Rosenberg (2015) refers to the tertiary sector as the service sector because it offers different kinds of services to support the activities of both the primary and secondary sectors. The sector according to Rosenberg (2015) is associated with such services as clerical services, insurance, restaurants, media,

healthcare, entertainment, transportation and distribution, tourism, retail and wholesale sales, banking and legal services, etc.

Several studies have looked at the structure of the Nigerian economy from various perspectives. The perspective from which the economy is presented in these studies depends entirely on the topic or issue at hand. It is worthy of note that the structure of the Nigerian economy has undergone several structural transformations over time. Hence, this has also dictated the path through which the structure is traced or the perspective from which the structure is presented. These changes in the structure of the economy are also evident in the rebasing of the nation's GDP in 2014. Kuznets (1973) described the process of structural transformation as the sustained increase in productivity and living standards. The author stated that structural transformation is very important to economic growth and he listed it as one of the six main features of modern economic growth. Herrendorf et al. (2013) also noted that structural transformation has to do with the reallocation of economic activity across the three broad sectors of the economy (agriculture, manufacturing and services). They noted that these three sectors accompany the process of modern economic growth.

With respect to the Nigerian economy, Olayide, et al. (1976) carried out a substantial review of the structure of the Nigerian economy; however, their work focused on sectoral analysis and was less comprehensive. Some sectors of the economy such as health, education and water resources were not covered in the review; as a result, not much information could be derived from it about the macroeconomic and structural transformations which had taken place. Olaloku, et al. (1979) made a similar attempt in their book: "Structure of the Nigerian Economy". This book was an improvement over the work of Olayide et al. (1976), as it included discussions on socio-economic services. The authors, however, still left out some vital components of the economy in the book.

Okongwu (1986) analysed the structure of the Nigerian economy and focused on the structural maladjustment in the early 1980's, which led to the deep recession and financial distress that was experienced in Nigeria. The information presented in the book was only limited to sectoral analysis (agriculture, manufacturing, energy, socio-economic services), as well as macroeconomic management. Kayode and Usman (1989) also reviewed the structure of the Nigerian economy, with emphasis on the first 25 years since independence. However, they did not give much attention to socio-economic services and the external sector in their discussion.

The Structural Adjustment Programme (SAP) of the International Monetary Fund (IMF) was introduced in 1986; it was aimed at guiding Nigeria in reforming its foreign exchange management system, trade policies, and business and agricultural regulations. After the introduction of the SAP, several authors decided to review the structure of the economy, given its impact and outcome on the economy. It was in the light of this that (CBN, 1993) reviewed the pre-SAP economic policies and its performance over the period (1960-1985). The authors appraised the macroeconomic policies (fiscal, monetary, exchange rate, trade, and external public debt management) that were put in place in the wake of the SAP, and evaluated sectoral performance (agriculture, industry, external sector, infrastructure and socio-economic services). They also brought to fore the key factors in the economic crisis that led to the adoption of the SAP. Notwithstanding as comprehensive as the report was, it concentrated more on the evaluation and analysis of the SAP policies which were appraised against its stated objectives. The report did not attempt to evaluate the extent of structural transformation that had taken place.

Synge (1993) also contributed to the pool of literature when he reviewed the structure of the economy along the line of the structural adjustment programme era. The author focused his work only on the SAP era, and this was one of the major limitations of the work. Still, within the same era, World Bank (1994) in its

economic sector report also reviewed the structural reforms in the Nigerian economy during the SAP era, looking at policies, implementation, and impact of the SAP. This review was centred on the evaluation of the performance of fiscal, exchange rate and foreign trade policies; public enterprise sector reforms; as well as the SAP incentives. The evaluation of sectoral performance (agriculture, labour market, manufacturing, oil and gas sub-sectors, poverty and basic social services) were only highlighted in real terms and reflected the structural changes that occurred during the review period.

Similarly, while conducting a review of the structure of the Nigerian economy, Iyoha and Oriakhi (2002) took into consideration the peculiarities and complexities embedded in the diversity of the economy. They gave a comprehensive account of the developments in the structure of the Nigerian economy from 1960-1997. Their discussion focused on economic growth within the appraisal period; performance of institutions; microeconomic agent's responses to agricultural, industrial, trade and other government policies; governance; as well as the general policy environment and the existing political economy. Emphases were placed on the changes in the sectoral contributions of each of the key sectors to Nigeria's growth, as well as, the key determinants of Nigeria's growth performance. They further delved into the effect of the SAP era, financial institutions and financial deregulation, and the degree of openness and urbanisation over the review period.

Garcia et al. (2008), and Okonjo-Iweala and Osafo-Kwaako (2007) also reviewed the structure of the Nigerian economy from different perspectives. Garcia et al. (2008) focused on the private sector enabling environment and pro-poor growth in the economy. The authors' presented information on Nigeria's economic structure and macroeconomic performance, demographic and environmental conditions, as well as indicators of poverty and gender inequality. However, they did not adequately cover the diversity in Nigeria's economic structure. On the other hand, Okonjo-Iweala and Osafo-Kwaako (2007) based their review on past economic reforms and policy measures that were implemented. They focused their

discussions on macroeconomic, governance, structural and institutional reforms, while also assessing the progress made and challenges faced in the course of implementing the various reform programs.

Having looked at the various reviews of the structure of the Nigerian economy, evidence points to the fact that the structure of the reviews and information presented were based on the context within which the discussion or review was being conducted. Also, the topic under discussion played a very important role in the conceptualisation of the elements of the review. It is against this background that this research will attempt to conduct an overview of the structure of the Nigerian economy based on the elements of the topic under discussion and the context within which the research is focused.

3.4 Performance of the Nigerian Economy over the Review Period

The Nigerian economy is made up of four interrelated sectors that function together to ensure that there are an efficient allocation and use of scarce resources in the production of goods and services. The economy is broadly categorised into financial, fiscal, external and real sectors. All these sectors are significant and strategic as they play important roles in the development of the economy. Also, all these sectors are susceptible to external shocks given the inter-linkages in the activities of each sector and the rest of the world economies. Furthermore, external shock affected some of these sectors directly or indirectly during the global financial crisis through these interlinkages and their exposure to activities related to the financial sector, capital market, import and export, as well as trade. The review of the structure of the Nigerian economy will be done with the above mentioned four broad sectors in mind. Though the discussion will not cover all the elements (sub-sectors) within the sectors, it will, however, endeavour to cover as much as possible (especially the sub-sectors or elements that are very vital to the topic under consideration).

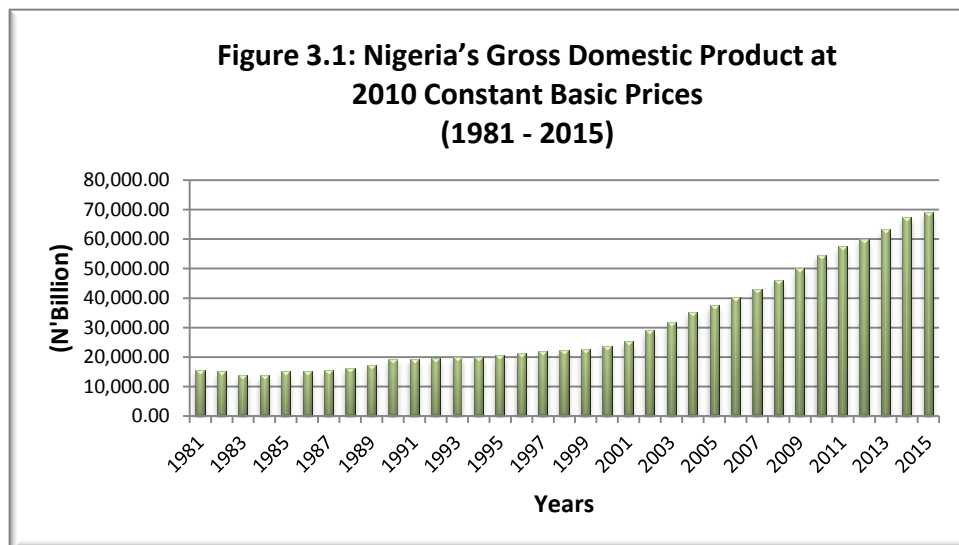
3.4.1 The Real Sector

The primary activity in the real sector is the actual production and distribution of goods and services. It is the sector that harnesses all the factors of production necessary to meet the consumption need of the economy and it is the productive base of the country. The real sector of the Nigerian economy consists of: Agriculture (crop production, livestock, forestry and fishery); Industry (crude petroleum and natural gas, solid minerals and manufacturing); Construction; Trade; and Services (transport, information and communication, utilities, accommodation and food services, finance and insurance, real estate, professional, scientific and technical services, administrative and support services, public administration, education, human health and social services, arts, entertainment and recreation) (CBN, 2010b; 2015). The gross domestic product (GDP) of the economy is most often discussed under the real sector, because it represents the total output of the economy.

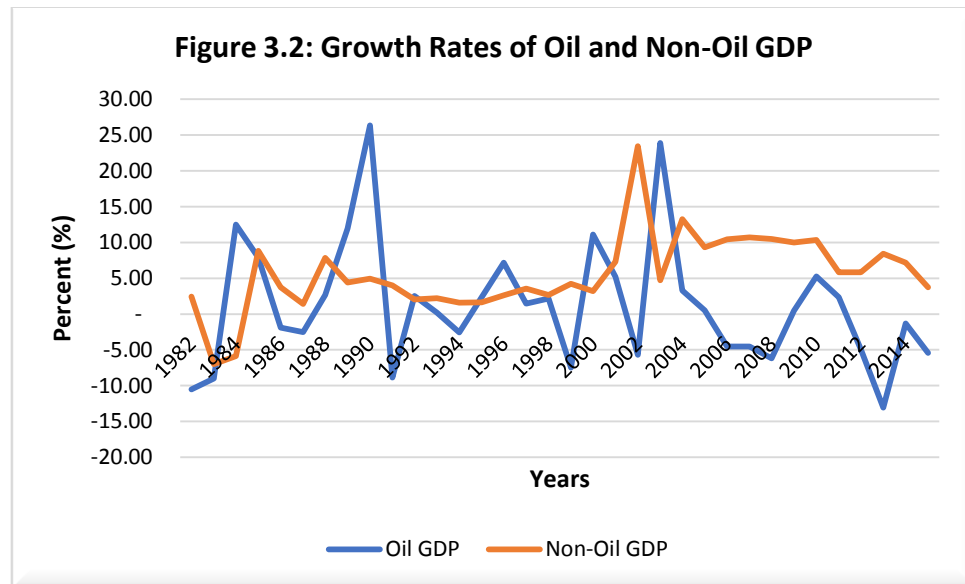
3.4.1.1 The National Income

The gross domestic product (GDP) is one of the major macroeconomic indicators that give a broad sense of measurement of the country's overall economic wellbeing or economic activity. Nigeria's GDP is a good starting point of presenting the Nigerian economy. Nigeria's GDP (at 2010 constant basic prices) stood at ~~₦~~23,688.3 billion in 2000 as against ~~₦~~19,305.6 billion and ~~₦~~15,258.0 billion in 1990 and 1981, respectively. In 2014, the nation's GDP was rebased (using 2010 as the new base year, from the previous 1990 base year) and this led to an increase in Nigeria's GDP to ~~₦~~54,612.3 billion in 2010 and ~~₦~~69,023.9 billion in 2015 (2010 constant basic prices). The structure of the Nigerian economy most often is depicted by the composition of the GDP by its economic activity (CBN, 2015). It is worthy of note that the Nigerian economy is broadly categorised into oil and non-oil sectors, and the GDP is also categorised into oil and non-oil GDP. The bulk of the country's revenue and foreign exchange earnings are derived from the oil sector.

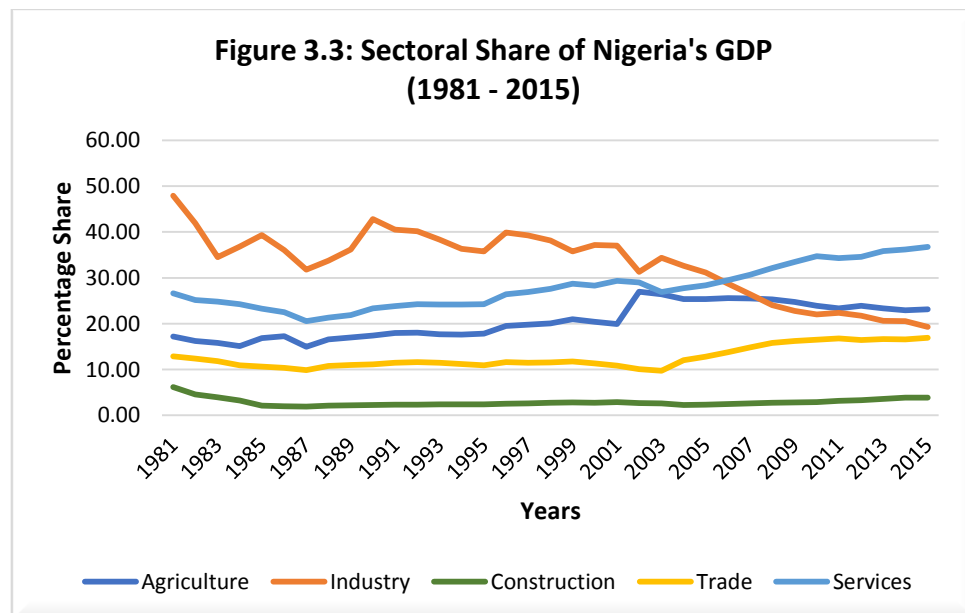
Before the discovery of oil in the country, which is computed in the GDP as a component of the industrial sector, the economy was predominantly agrarian with agriculture accounting for about 64.1% and 47.6% of the GDP in 1960 and 1970, respectively (CBN, 2010a). After the discovery of oil in the early 1970's, the share of agriculture declined over time with oil taking over, accounting for about 33.6% by 1981. The period between 1990 and 2002 saw the contribution of agriculture to GDP ranging between 37.9% and 42.1%. This figure has hovered around 41.0% since 2003 (CBN, 2010a). Rebasings of the GDP in 2014 brought a different dimension to the shares of the various sectors in the GDP. With the rebasing, the agriculture and oil sectors which were dominant in their share in the GDP over the years were overtaken by the services sector, whose share in the GDP ranged between 34.0% and 38.0% between 2010 and 2015 (CBN, 2014; 2015). The recent dominance of the services sector reflected the positive developments in the telecommunications, motion pictures and music (Nollywood and entertainment) sub-sectors.



Source: CBN (2015 a & b)



Source: CBN (2015 a & b)



Source: CBN (2015 a & b)

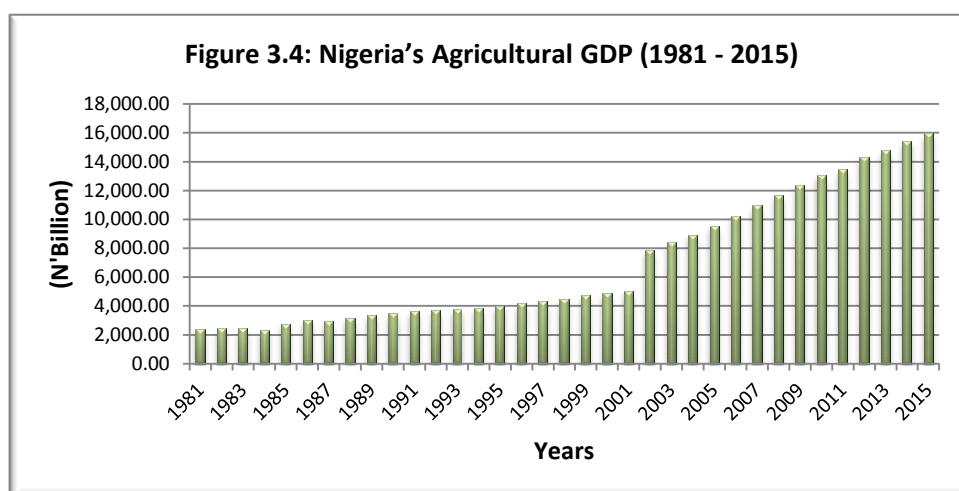
Nigeria's total gross domestic product was impacted through one of its major components, the oil GDP. The oil GDP is dependent on the price of crude oil in the international crude oil market. International crude oil prices (an external shock) affected Nigeria's total GDP during the global financial crisis as oil prices fell from a high of \$147 as at July 2008 to about \$50 by January 2009, thus reducing the

quantity of foreign exchange earnings, government revenue from the sale of crude oil, as well as the size of the oil GDP (Muhtar, 2009). The oil sector GDP fell at the peak of the crisis, touching a low of -6.19% growth rate in 2008 (Hemen et al., 2014). The high dependence of the Nigerian economy on oil revenues affected the national budget at the time, because the about \$50 per barrel of oil was below the \$58 per barrel of oil benchmark for the 2008 Budget. Also, pressures from the expectation that oil prices could slide further down forced the Federal Government to reduce the 2009 budget benchmark to \$45 per barrel (Hemen et al., 2014). Consequently, the main external effect of the global crisis was transmitted into the Nigerian economy (affecting output performance) through the international crude oil prices, which is externally determined.

3.4.1.2 The Agricultural Sector

The Nigerian agricultural sector is still basically subsistent and not fully mechanised. The sector is basically a mixture of the informal traditional farming system and the modern farming system. NBS (2010) estimated agricultural output from the traditional agricultural system at about 90.0% of total agricultural output, while the modern or mechanised farming system accounts for the balance. Nevertheless, the agriculture sector has remained a very significant sector within the Nigerian economy, as it employs a clear majority of the Nigerian populace and still contributes significantly to the GDP. According to NBS (2016), between the period 2008 and 2015, the agricultural sector employed an average of 44.6% of Nigeria's active population. Nigeria has a vast mass of arable land for agricultural purposes, but this is gradually diminishing over time. Land area per capita has been declining since the 1980's. It declined from 1.176ha in the 1980's to 1.004ha in the 1990's, and subsequently to 0.793ha and 0.20ha in the period 2000-2006 and 2007-2015. Consequently, the available cultivable land area per capita also declined from 0.886ha in the 1980's to 0.756ha in the 1990's, and subsequently to 0.597ha in 2000-2007 and 0.21ha in 2008-2015 (NBS, 2010; 2016).

Regarding the sector's share in the GDP, the sector's share in total GDP within the periods 1981-1989, 1990-1999, and 2000-2007 averaged about 38.1%, 39.3%, and 42.0%, respectively (CBN, 2015b). Notwithstanding the importance of the sector in the Nigerian economy, its share in the GDP in recent times (the period 2010-2015) have declined to an average of 23.4%, portraying the dynamics within the economy and the change in economic activities (CBN, 2015b). The agriculture GDP growth rate averaged 3.0% in the decade prior to 2003. It went up to an average of 7.0% between the period 2003 and 2007, and an average of 4.2% between 2010 and 2013, and 3.7% in 2015 (CBN, 2015b). The agriculture sector is categorised into crops production, livestock, fishery and forestry sub-sectors. Over the years, crops production has always dominated within the agriculture sector. As at 2015, analysis of the structure of the agricultural sector by economic activities still shows crops production as the dominant sub-sector (89.5%), followed by livestock (7.2%), fishery (2.2%) and forestry (1.1%) (CBN, 2015a).



Source: CBN (2015 a & b) – Figures are at 2010 Constant Basic Prices

The agriculture sector has not been doing badly in terms of export. The value of the sector's export averaged ₦725.8 million in the period 1981 and 1989, ₦802.7 million between 1990 and 1999, and ₦793.0 million between 2000 and 2007 (CBN, 2015b). The performance of the sector's export reflected the various efforts of the government towards making the sector a prime mover in the economy (Anyanwu et al., 2011). For example, the period 1999-2007 witnessed the implementation of the

presidential initiatives on agricultural production and export as part of government's effort at reviving agriculture. These initiatives resulted in increased growth in the value of agricultural exports by 36.0% to ₦53,733.4 million in the same period. The value of export of processed agricultural products (manufactures and semi-manufactures) which averaged ₦50.7 million between 1981-1989, increased to an average of ₦834.0 million between 1990-1999 (CBN, 2015b). This was due to various industrial sector policies initiated to boost Nigeria's export of textiles, soap/detergent, beer/beverages, tyres and processed hides and skins, as well as cocoa products. The period 2008-2015 saw the implementation of various agricultural transformation initiatives geared towards the diversification of exports. These agricultural transformation initiatives resulted in further increase in the export of agricultural produce, with the value of agriculture export averaging ₦47,886.1 million (an annual growth rate of 26.5% during the period) (Ajakaiye, 2001; Eneh, 2011; Obiora, 2014; CBN, 2015b).

Given the desire of the government to make the sector a prime mover in the economy and to diversify the economic fortunes of the country away from oil, the Federal Government and the CBN over the years put in place several initiatives to boost credit allocation to the sector and provide the necessary support. Most of the intervention schemes include: The Agricultural Credit Guarantee Scheme (ACGS), the ₦240 Billion Commercial Agricultural Development Programme (CADP), the ₦200 billion Commercial Agriculture Credit Scheme (CACS), the Nigeria Incentive-based Risk Sharing System for Agricultural Lending (NIRSAL), the Agricultural Credit Support Scheme (ACSS), the Trust Fund Model (TFM), Interest Drawback Programme (IDP) and the Anchor Borrowers' Programme. Other initiatives were the Presidential Initiatives on Agriculture; National Special Programme for Food Security; establishment of the Abuja Securities and Commodity Exchange, and the Agricultural Development and Marketing Companies. Further initiatives were the Agricultural Transformation Agenda (ATA); as well as the 2015 Agricultural Policy with an underlying philosophy of "agriculture as a business sector" to achieve food

security and economic growth in the country (NPC, 2009; Obiora, 2014; Raimi et al., 2014; NBS, 2016).

The impact of the external shocks introduced into the Nigerian economy via the global financial crisis did not heavily impact the Nigerian agricultural sector because of its subsistent nature and its low share in total export. There was growth within the sector during the period, but it was not as much as before the crisis. The index of agricultural production increased by 4.8% in the first half of 2008, compared with 7.4% recorded in the first half of 2007. The output from staples rose by 4.9% in 2008, compared with 10.7% in 2007. The output from the livestock, fishery and forestry sub-sectors rose by 5.8%, 4.1% and 1.2% in 2008, respectively, compared with 4.0%, 9.3% and 1.1% achieved in 2007. However, the sector was affected indirectly as food prices increased rapidly during the period of the crisis. The composite food index rose by 0.9% in January 2009. The rise in the index, higher than that of the previous year, was caused by increases in the price of staple foods like maize, yams, millet, meat, fruits and vegetables (Ajakaiye and Fakiyesi, 2009).

3.4.1.3 The Industrial Sector

The Nigerian industrial sector is characterised by many informal small enterprises and a few large formal firms. According to CBN (2010a), small and medium scale enterprises account for about 70.0% of industrial employment and about 10.0% to 15.0% of manufacturing output. The small-scale enterprises (SSEs) often operate in the rural areas, while the medium scale enterprises (MSEs) operate in the urban areas where they can take full advantage of available infrastructure (financial, physical and social). These SSEs are made up of craftsmen and artisans who engaged in the production of basic consumer goods such as footwear and other leather products; home and office furniture; weaved apparels, as well as food products and services like metal works, printing, automobile repairs, etc. The Nigerian industrial sector is categorised into three sub-sectors: crude petroleum and natural gas, solid minerals, and manufacturing. Over the period 1981-1990,

1991-2000, 2001-2010 and 2011-2015, the industrial sector has contributed an average of 47.5%, 48.2%, 22.7% and 38.6% to the GDP, respectively (CBN, 2015b).

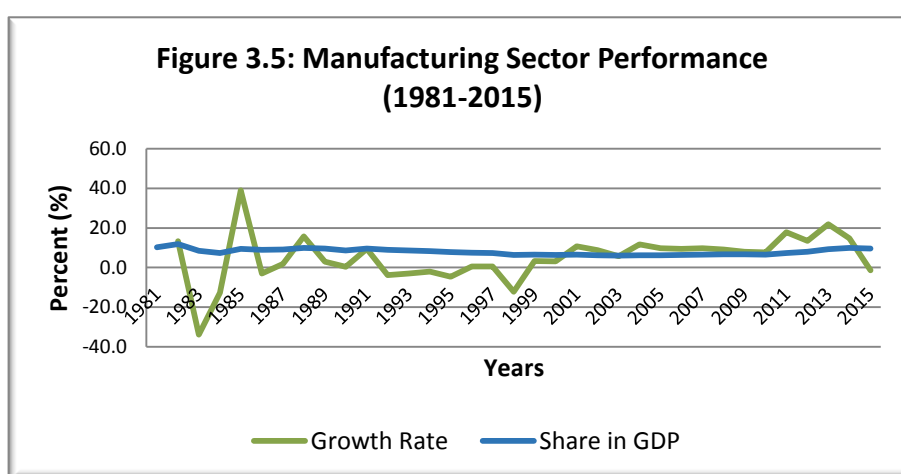
The Nigerian industrial sector was not spared from the impact of the external shocks that was experienced during the financial crisis, as the sector was indirectly affected through increased energy price, the high cost of imports and the credit crunch. There were spates of decline in industrial activities and massive closure of industries. No sub-sector was left out, from food, beverages and tobacco sector to the textile, iron and steel, electrical and electronics, motor vehicles and assembly sector, and others, the story was the same (Ngwube and Ogbuagu, 2014). Industrial output declined due to the higher cost of obtaining working capital by industries, as banks increased interest rates and reviewed collaterals for their loans as securities such as shares lost value. Industries were faced with high cost of procuring inputs that were imported in the face of exchange rate volatility and risk. Overall, the consequences were increased unemployment, de-industrialisation and higher inflation (Sanusi, 2010b).

3.4.1.3.1 The Manufacturing Sub-Sector

The Nigerian manufacturing sub-sector is dominated by the consumer goods industries, which accounts for about 70.0% of the value-added and 75.0% of the employment in the sub-sector. Regarding categorisation, the manufacturing sector is categorised into small-scale and micro-industries (65.2%), medium scale industries (31.3%) and large-scale industries (3.5%), with respect to the size of each category in the total number of manufacturing units within the sector (CBN, 2010a).

The contribution of the manufacturing sub-sector to GDP has fluctuated over time due to government's negligence, poor policy prescriptions and the inability of the government to get the infrastructural needs of the economy right. Also, the exchange rate has played a major role in the inefficiency and poor contribution of

the sub-sector to the GDP because of the over-reliance of the sector on imports of raw materials. In 1982, the manufacturing sub-sector contributed 6.5% to the GDP, and 6.2% and 5.9% in 1998 and 2001. By 2004, its contribution went to 6.5%, and 4.4% and 4.1% in 2006 and 2009. Due to government's renewed interest and various intervention programmes in the sub-sector, its contribution began to rise steadily to 6.6%, 7.3%, 7.9% and 10.3% in 2010, 2011, 2012 and 2013, respectively. However, it subsequently declined to 9.9% and 9.5% in 2014 and 2015 (Soludo, 2007; CBN, 2010a and 2015b).



Source: CBN (2015 a & b)

It is worthy to note that the increase in the contribution of the sector to the GDP during the period 2010-2015 was not policy-induced, but due to the much better capturing of activities within the sector following the 2014 GDP rebasing exercise. Before 2014, manufacturing GDP was captured only through 3 activities: oil refining, cement and other manufacturing. After the rebasing exercise, the other manufacturing activities were further broken down into 11 different activities for easy capturing and more economic activities were captured. The new categorisation of economic activities, based on the improved capturing of activities in the manufacturing sector after the rebasing are food, beverage and tobacco; textile, apparel and footwear; wood and wood products; and pulp, paper and paper products. Others are chemical and pharmaceutical products; non-metallic products; plastic and rubber products; electrical and electronics; basic metal, iron and steel;

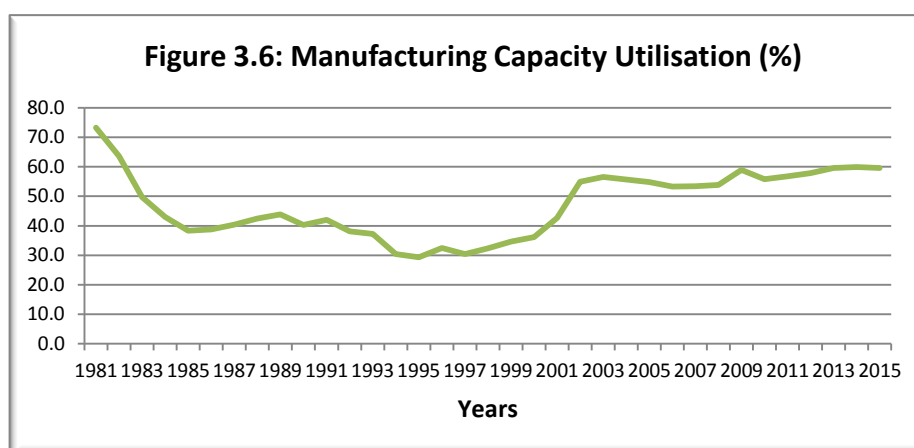
motor vehicles and assembly; as well as other manufacturing (Awojobi et al., 2014).

The period 1982 to 1985 in the manufacturing sector was not quite impressive, as there was a drastic decline in the growth of the import-based consumer goods and assembly-oriented industries. This was partly due to the collapse of oil prices in the international market and the shortage in foreign exchange supply, which led to a huge drop in the quantum of imported raw materials and spare parts required by the relevant manufacturing units. Between the period 1980 and 1984, manufacturing production fell at an average rate of about 1.5% per annum, due to the huge reduction in gross investment to and capacity utilisation in the sub-sector, attributable to the reasons mentioned above (Adebusuyi, 1997).

The liberalisation policy that followed the introduction of SAP in 1986 saw manufacturing production grow by an average of 8.1% between 1987 and 1992. Local industries that depended on locally sourced inputs such as beer and stout; cotton textile; cement and roofing sheets performed relatively well, while on the contrary, the import-dependent industries still could not meet up. The naira devaluation during 1986-1988 led to high cost of imported inputs for the import-dependent industries. The overall manufacturing capacity utilization rate which fell from 42.0% in 1984 to 37.1% in 1985 increased to 38.9%, 40.4%, 41.5% and 42.4% in 1986, 1987, 1988 and 1989, respectively (CBN, 1993; IMF, 1997; CBN, 2015b). Nevertheless, the improved performance in the sector could not be sustained, as the average growth in manufacturing output in the period 1985-1989 declined from 13.0% to 0.2% and 1.9% in 1990-1994 and 1995-1998. In terms of value added, the sub-sector which was expected to accomplish an overall increase of 15.0% value added, only achieved an average increase of 2.7% between 1986 and 1995; and an average decrease of 1.3% between 1995 and 1997 (CBN, 1993; IMF, 1997; CBN, 2015b). This was due to the frequent breakdown of infrastructural facilities (particularly incessant power outages); increase in the cost of production (in relation to high exchange and interest rates, high costs of imports, the high cost

of power generation and provision of other vital infrastructures); as well as high consumer preference for imported products.

These challenges continued to impact negatively on the sector, resulting in a slow and unimpressive response to various efforts by the government to grow the non-oil sector through manufacturing production. Following a series of government interventions in the sector, the manufacturing capacity utilisation rate increased from 34.6% in 1999 to 36.1%, 42.7%, 54.9% and 56.5% in 2000, 2001, 2002 and 2003. However, it fell slightly, but still hovering a little above 50.0% to 55.7%, 54.8%, 53.3% and 53.5% in 2004, 2005, 2006 and 2007, respectively (CBN, 2015b). Capacity utilization continued to hover around 50.0% for the rest of the period, from 54.7% and 55.4% in 2008 and 2009 to 56.2%, 56.3%, 56.8%, 57.8%, 59.6% and 59.9% in 2010 through 2015. Manufacturing production growth rate averaged 8.4% from 2007 to 2015, with an all-time high of 24.6% in 2013 (CBN, 2015b).



Source: CBN (2015 a & b)

The manufacturing sub-sector did not contribute much to export earnings, despite all of the government's effort and programmes, because the challenges that plagued the sector were never effectively addressed. Nigeria's manufacture's exports have been unable to compete favourably in the international market due to

the high cost of production from inadequate infrastructural needs, application of inefficient technological processes, lack of standardised export products, as well as uncompetitive product pricing (CBN, 1993; Adebusi, 1997; CBN, 2010a). The share of manufactured exports accounted for only 5.6% of total non-oil export between 1987 and 1997. However, by 1999 and 2000, its share rose to about 15.3% and 15.7% but subsequently fell to 8.5% and 5.5% in 2003 and 2004, due to some restrictive government policy on the importation of certain items. By 2007 and 2008 it rose again to 10.3% and 11.2% and has been on a steady increase after the 2014 rebasing exercise that expanded the number of manufacturing activities captured. Consequently, the share of manufacturing export to total non-oil export rose to 10.9%, 12.8% and 19.9% in 2011, 2013 and 2015, respectively (CBN, 2010 and 2015; Awojobi et al., 2014).

The shocks which manifested because of the financial crisis led to a huge decline in the performance of the manufacturing sector. It resulted in increased unemployment, reduced earnings and investments, as well as the withdrawal of credit lines. The impact of the shock from the crisis is as posited by the proponents of economic shocks in the real business cycle theory. When there is a shock, it translates into a change in economic performance, which might be temporary. The business cycle theorist posits that if there are insufficient consumption and unstable investment, it can bring about fluctuations in output and unemployment (Atoyebi et al., 2014). This was the case in Nigeria during the financial crisis, where the credit crunch and increased energy cost acted as a shock to the manufacturing sector. The average manufacturing capacity utilisation rate estimated at 52.6% in 2008, fell by 3.1% and 0.2% below the levels in the preceding half year and the corresponding period of 2007, respectively (Ajakaiye and Fakiyesi, 2009). The fall in manufacturing capacity utilisation was the instantaneous causal effect of the shocks (increased energy price, the high cost of imports and the credit crunch) transmitted through the economic meltdown, which led to the inability of firms to maintain the current productive capacity. These shocks which resulted in increased business expenses and reduced productivity, hampered economic growth and

caused many firms to shut down or relocate to neighbouring countries. Furthermore, there was a loss of competitiveness against manufactured products from the rest of the world, especially China.

3.4.1.3.2 The Mining Sub-Sector

The mining industry is one of the oldest sectors in Nigeria. The initial activities in this sub-sector centred on the exploration of tin, gold and other non-metallic ores. Attention to fuel minerals commenced with the exploration of bitumen in 1908, coal in 1909 and crude oil in 1956 (Kayode and Usman, 1989). The commercial exploration of all these minerals has contributed to the economic development of the country. A greater part of the country's foreign earnings is derived from the export of these minerals. However, with the discovery of crude oil and its exploration in commercial quantity, the importance of other minerals was de-emphasised. Since the 1970's, more attention has been focused on crude oil production, which has become the country's biggest source of foreign exchange earner and largest export produce (Kayode and Usman, 1989). The production of natural gas has recently joined the boom of crude oil in commercial quantity.

Nigeria has four refineries with a total installed production capacity of 445,000 barrels per day (Olayide, 1976; Adebusi, 1997; CBN, 2010). These are:

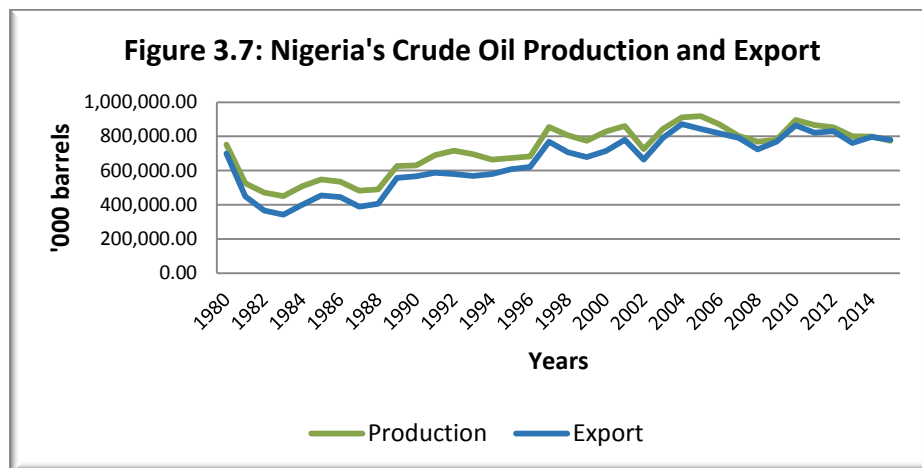
- The Port Harcourt Refinery which has an installed capacity of 60,000 barrels per day (bpd), up from its initial crude oil refining capacity of 35,000 bpd and later expanded to 55,000bpd. It was commissioned in 1965;
- The Warri Refinery commissioned in 1978 with an initial installed capacity of 100,000 bpd, and expanded to 125,000 bpd in 1987;
- The Kaduna Refinery which had an initial installed capacity of 100,000 bpd was commissioned in 1980 and upgraded to 110,000 bpd in 1986; and
- In 1989, the second Port Harcourt Refinery was commissioned, with a 150,000 bpd capacity.

Crude oil production in Nigeria has been plagued by incessant disruptions caused by crude oil facilities vandalism by militant groups and various developments in the international crude oil market. The glut in the international crude oil market in the early 1980's, resulting from excess supply, led to a fall in crude oil price and eventually a cut in crude oil production by the Organization of Petroleum Exporting Countries (OPEC) member countries in 1986. Consequently, Nigeria's crude oil output fell from 760.1 million barrels in 1980 to 535.9 million barrels in 1986. Export volume during this period stood at an averaged 92.7% of total output (Iyoha and Oriakhi, 2002).

For the government to maximise its benefit from the sector due to low production, it entered several Memorandum of Understandings (MOUs) with some oil companies. This was to encourage investment in the sector and guarantee notional margins to the companies, based on their level of cost efficiency and investment. The main objectives of the MoUs were to raise production and increase reserves (Olayide, 1976). Consequently, crude oil production rose to 711.3, 855.7 and 772.9 million barrels in 1992, 1997 and 1998, respectively, from its level of 383.3 million barrels in 1987. Export volume rose to 627.9 and 675.3 million barrels in 1996 and 1998, from 390.5 million barrels in 1987 (CBN, 2015b). In subsequent years, total crude oil production further rose to 863.74 and 866.24 million barrels in 2001 and 2006. However, due to incessant production disruption by the activities of militant groups, production fell in 2011 to 866.2 million barrels and further to 704.45 and 708.10 million barrels by 2013 and 2014 but increased to 773.80 million barrels by the end of 2015 (CBN, 2015 a & b). Similarly, export volume rose consistently to 767.95, 780.09 and 817.47 million barrels in 1997, 2001 and 2006, respectively. By 2011, export volume had increased to 867.47 million barrels despite the decline in production output, due to the accumulation of output from failing refineries. By 2013, 2014 and 2015, export volume stood at 540.20, 543.85 and 609.55 million barrels (CBN, 2015 a & b). Up to 2012, the decrease in export volume resulting from production decreases was attributable to production disruptions by host community restiveness, whereas, the sustained decline in export volume from

2013 was the result of loss of market share in the U.S.A (discovery of shale oil) who has been a major buyer of Nigeria's crude oil for many decades.

Crude oil contributed significantly to government revenue, as it accounted for an average of 70.4%, 75.7% and 79.5% of total federally-collected revenue in 1980-1989, 1990-1999 and 2000-2004, respectively (CBN, 2015b). During these periods, the total federally-collected revenue benefited from the decline in world oil output due to the crisis in the Middle-East and increased economic activities in developed countries, which translated into an increase in crude oil price in the global market. Crude oil continued to maintain its contribution to government revenue in subsequent years as it averaged 79.2% in the period 2005-2010 and 69.6% in the period 2011-2015 (CBN, 2015b). This statistic shows the inability of the government to diversify the revenue base of the economy away from oil and the increasing dependence on the oil sector as the major driver of the economy.



Source: NNPC Annual Statistical Bulletin (1997 - 2015) and CBN 2015a

With respect to natural gas, the trend of activities in natural gas production in Nigeria is very similar to that of crude oil. This is because natural gas in Nigeria is derived from the exploration of crude oil. Before the mid-1980's, much of the natural gas gotten was flared, owing to high recovery cost and lack of ready market. By 1984, the government initiated stiff penalties for gas flaring (with regards to environmental concerns). This helped to reduce the amount of gas

flared, as part of the gas was re-injected into the ground and market sort for the other part.

The shock from the fall in international crude oil price and the slowdown in economic activities in developed countries economies led to a reduction in the demand for Nigeria's crude oil. This provided a platform for reduced macroeconomic performance through the fall in government revenue and foreign exchange earnings. Petroleum production and export have been the mainstay of the Nigerian economy, providing a high percentage of the country's revenue earnings (Ogbonna, 2004). The economy's dependence on the oil sector is very significant, as about 90.0% of its foreign exchange earnings and about 80.0% of government revenue are directly derived from activities related to the export of this single commodity (Adamu, 2009). The advent of the global financial crisis led to a decline in international crude oil price that had peaked at \$147 per barrel in July 2008 to about \$50 per barrel by January 2009. This presented a huge danger for the economy because it led to a significant reduction in oil revenue, with dire consequences for the economy (Gbolahan, 2010). With over 70.0% of all federally collected revenues being related to oil, the crash in oil prices manifested in the depletion of Nigeria's revenue with a drop of ₦177.52 billion in accruals to the Federation Account in November 2009. According to the Technical Sub-committee of the Federation Account Allocation Committee (FAAC), the revenue that accrued to the Federation Account from oil dropped from ₦530.86 billion in October 2008 to ₦353.34 billion in November 2008 (Bitrus, 2011). By year-end 2007, the crude oil production shut-in stood at 0.9 million barrels a day (Ajakaiye and Fakiyesi, 2009).

The Nigeria oil and gas sector has not been able to produce the expected benefit to the economy due to several challenges that have persisted over the years. These challenges have most importantly affected the country's refining capacity, thereby not allowing the country to reap the full benefits of having crude oil. The decline in the performance of the local refineries started in the early 1990s after the military Government ordered the Nigeria National Petroleum Corporation (NNPC)

to close its accounts in commercial banks and transfer them to the Central Bank. NNPC lost its autonomy. It became increasingly subjected to interference and directives by politicians. It could no longer ensure prompt maintenance of the refineries. Most importantly, decisions on when to carry out turnaround maintenance and which contractor to execute it, came under the influence of the Government rather than by the professionals within the corporation. Things very quickly went downhill thereafter as the decline in capacity utilization began to manifest (NNPC Refineries Performance Reports, 2012).

The sorry situation of the lack of refining capacity for the refineries and low capacity utilization of even the existing capacity which developed and still exists today was heightened by the issues of: poor governance and the lack of major turnaround maintenance which has not been carried out in any of the refineries since 2008. The last turnaround maintenance in the Port Harcourt Refinery was carried out in 2000. This should be viewed against the established best practice worldwide that turnaround maintenance should be conducted by refineries every two or maximum 3 years. Also, pipelines supplying crude oil to the refineries, and those conveying products from them were routinely vandalized. This led to massive loss of revenue and increase in production cost.

3.4.1.4 The Services Sector

In recent times, the services sector has managed to register its presence in terms of increased importance and dominance of its contribution to the GDP. After the GDP rebasing exercise, the share of the service sector increased dramatically. The share of the sector in the GDP in 2010 was 34.8% and 34.3% in 2011 and subsequently rose to 36.8% in 2015. Over the review period 1981-1990, 1991-2000, 2001-2010 and 2011-2015, the share of the services sector averaged 25.4%, 26.7%, 30.2% and 35.5% of the GDP (CBN, 2015b).

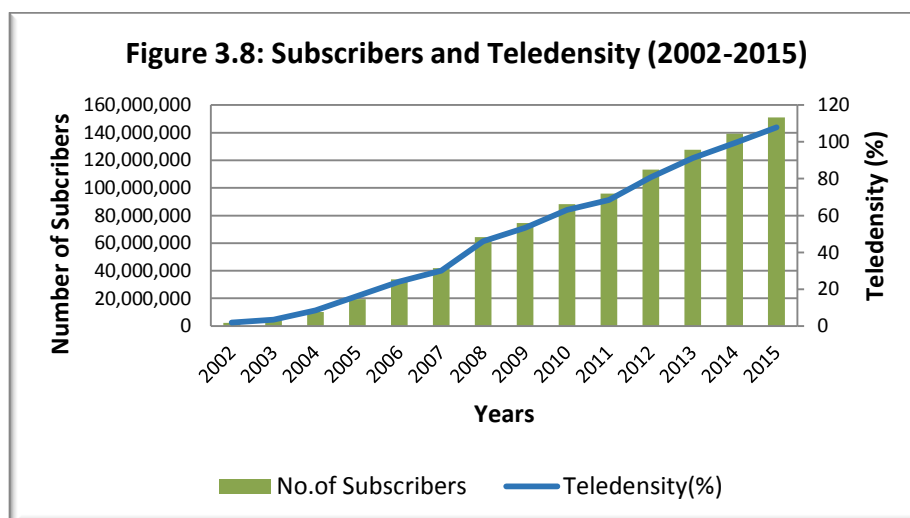
The Nigerian services sector is basically made up of 13 sub-sectors: transport; information and communication; utilities; accommodation and food services;

finance and insurance; real estate; professional, scientific and technical services; administrative and support services business services; public administration; education; human health and social services; arts, entertainment and recreation; as well as other services (CBN, 2015 a & b). Of these sub-sectors, information and communication have been doing very well and contributing much to the GDP. Hence, more emphasis will be given to it. The information and communication sub-sector of the services sector is made up of the postal services and the telecommunication services (information and communication technology services (ICT)).

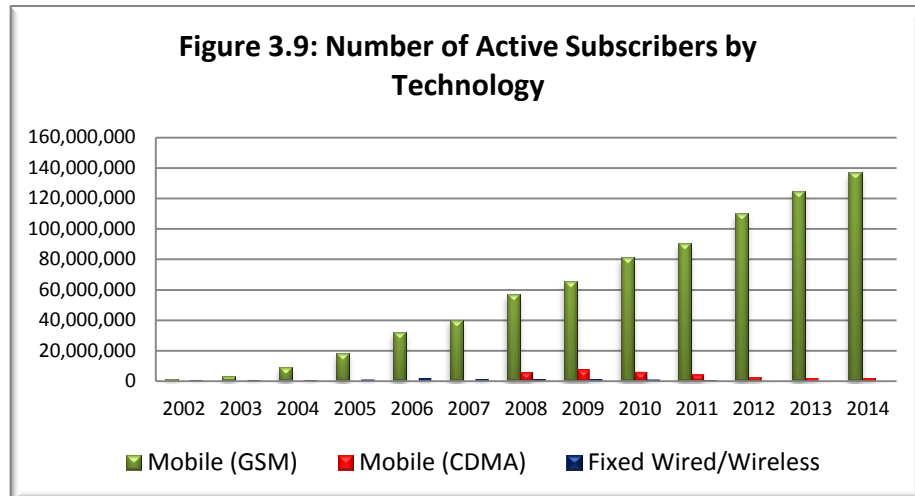
The Nigerian Communications Commission (NCC) is the regulatory authority in Nigeria's telecommunications sub-sector. The NCC is saddled with the responsibility of fostering healthy competition amongst operators by creating the enabling environment. It also ensures that subscribers get value for their money through the provision of quality and efficient telecommunications services by the operators. The telecommunications industry witnessed a massive turnaround after the liberalisation of the industry in 1999 and the advent of the Global System for Mobile communication (GSM). From less than 500,000 active fixed lines as at mid-2001 to as much as 10.2 million connected fixed and mobile (GSM and Code Division Multiple Access - CDMA) telephone lines in 2004, and subsequently to 19.8 million in 2005, 34.0 million in 2006, and 42.0 million in 2007. Since then, the industry has not relented in its growth as the total number of active lines had gone up to as much as 139.14 million in 2014 and further to 151.36 million in 2015 (CBN, 2005; 2010b; 2015a). Consequent upon this major development, teledensity² increased to 15.72 and 24.29 by 2005 and 2006, from 0.42, 1.89 and 8.50 in 1999, 2002 and 2004, respectively. The teledensity, which is dependent on the number of connected lines, followed the same trend as the number of active lines. It continued to increase to 29.98 in 2007, and subsequently, it increased steadily and significantly, reaching 107.9 in 2015 (CBN, 2005; 2010b; 2015a).

² Teledensity is calculated as the number of main lines per 100 inhabitants

The positive developments in the industry resulted in a huge increase in the number of Internet Service Providers (ISPs) in the country to about 184 by 2015. Consequently, internet penetration and the number of internet users which was 0.1% and 107,194 in 2000 increased to 1.4% and 1,769,661 in 2004. By 2014 and 2015, the total number of internet subscribers had increased to 76.32 and 97.03 million, with Nigeria being ranked among the fastest growing telecommunications markets in the world (CBN, 2005; 2010b; 2015a). Regarding the sub-sector's share in GDP, the sub-sector has made its mark as it accounted for 10.9% and 10.6% in 2010 and 2011. By 2012, it maintained its share steadily, hovering around 10.5%, and 10.7% and 10.8% in 2013 and 2014, respectively. By 2015, it accounted for 11.2% of Nigeria's GDP. Since the liberalisation of the sub-sector, investment in the sub-sector grew tremendously from \$50.0 million in 1999 to as much as \$7.5 billion in 2005 and further to \$11.5 billion in 2007. By 2013, total investment in the sub-sector had increased well over \$25.0 billion (CBN, 2005; 2010b; 2015a).



Source: NCC Industry Statistics – Statistics & Reports 2016



Source: NCC Industry Statistics – Statistics & Reports 2016

Nigeria's services sector is quite large and has various sub-sectors within it, thus evaluating the impact of the external shocks generated by the global financial crisis on the sector would not be an easy task. However, the sub-sectors were affected directly or indirectly by shocks from various macroeconomic variables such as the exchange rate, low patronage of business services, capital inflow, low export demand, reduced foreign exchange and a host of other factors. Inflation during the period spiked from about 6.0% in 2007 to 15.1% in 2008 and had remained at double-digit since, and this had serious implications on the cost of doing business within the sector. The impact from the oil price shock which brought about the decrease in the revenue profile of the country had great implications for infrastructural development, technological development, and industrial growth among others, which are to assist the services sector to thrive.

3.4.2 The Financial System

The Nigerian financial sector is categorised into formal and informal, with the informal sub-sector reflecting the cultural and social norms of the country. The informal sector is characterised by lending and deposit mobilisation in small-scale, purely cash-based transaction, less sophisticated record-keeping techniques, and higher interest rates than the formal sector. The formal financial sector in Nigeria is

made up of the regulatory authorities, the financial market players, the development finance institutions, and other financial institutions. The Central Bank of Nigeria (CBN) is the apex regulatory authority in the financial sector, alongside other supporting regulatory agencies: The Nigerian Deposit Insurance Corporation (NDIC), The Securities and Exchange Commission (SEC), The National Insurance Commission (NAICOM) and The National Pension Commission (PENCOM).

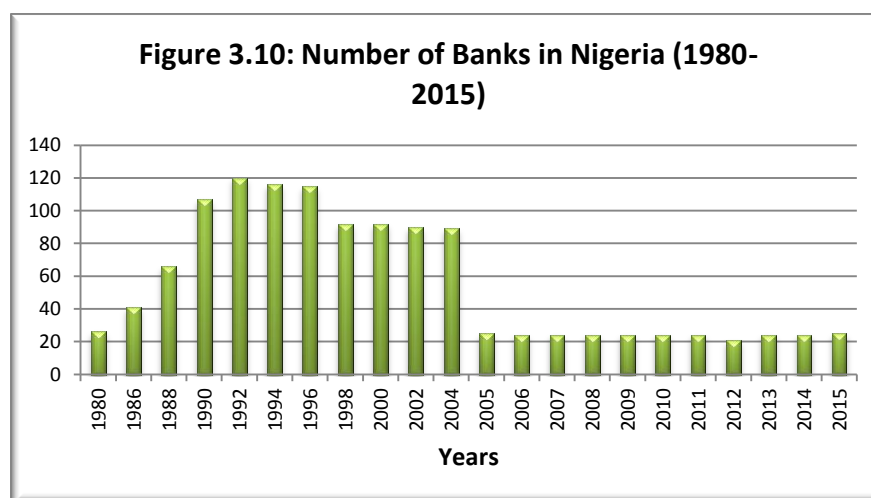
The financial market players consist of the deposit money banks (DMBs) – formerly categorized into commercial and merchant banks; discount houses (DHs); microfinance banks (MFBs); finance companies (FCs); primary mortgage institutions (PMIs); development finance institutions (DFIs); bureau de change (BDCs); stock exchange; commodity exchange; and insurance companies (CBN, 2010a). The Central Bank of Nigeria (CBN) is the apex regulatory body of the Nigerian Banking Sector. Established by the Central Bank Act of 1958, it is primarily responsible for the overall control and regulation of the banking system. It has the following core mandates: issuance of legal tender currency; banker to other banks as well as banker and financial adviser to the Federal Government; promotion of price and monetary stability as well as sound financial structure; and maintenance of external reserves to safeguard the international value of the domestic currency (CBN, 1991).

The liberalisation of the financial sector between 1986 and 2000 brought about the rapid growth in the sector. The positive development in the growth and structure of the financial system brought about an increase in the number of commercial banks from 14 banks in 1970 to 66 in 1993. However, this number declined to 54 in 2000, due to the liquidation of some banks. Similarly, the number of merchant banks increased from 1 in 1970 to 53 in 1993 and subsequently declined to 38 in 2000, bringing the total number of banks in the system to 92 in 2000 (Kama, 2006).

In 2001, the universal banking model was introduced, and it significantly changed the financial landscape, removing the dichotomy between the commercial and

merchant banks. With the introduction of the universal banking model, the commercial and merchant banks were given a new nomenclature – deposit money banks (DMBs). They could now engage in both money and capital market activities as well as in insurance business depending on the individual bank’s operational preferences. Subsequently, between the period 2001 and 2004, the total number of DMBs in operation stood at 89 (Nnanna, 2004).

In 2004, the CBN embarked on the recapitalisation and consolidation of the banking system for efficient service delivery and to address the recurring problem of systemic distress in the banking industry. By the end of 2005, which marked the end of the first phase of the banking sector consolidation exercise, the number of DMBs was reduced to 25 following various mergers and acquisition deals (Kama, 2006; Adeusi and Oke, 2013). By the end of 2015, the number of licensed DMBs remained the same, with a new structure of 20 commercial banks, four merchant banks and one non-interest bank (CBN, 2015a).



Source: CBN (2015 a & b)

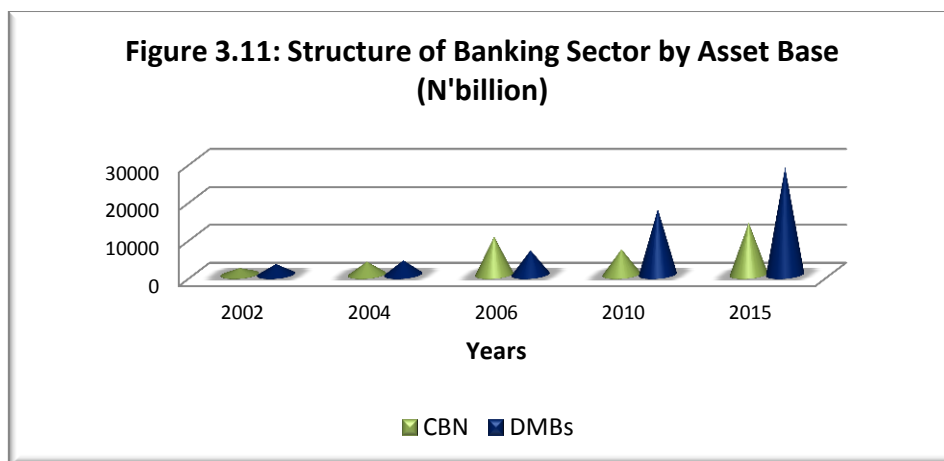
Similarly, the other players were not left out in the growth as the number of BDCs, and PMIs increased from 126 and 90 in 2005 to 322 and 91 in 2006, respectively and subsequently to 2,839 BDCs and 35 PMIs by the end of 2015. The number of FCs, DHs, DFIs, stock exchange and commodity exchange remained unchanged at 112, 5, 6, 1 and 1, respectively. Also, the number of MFBs in Nigeria at the end of 2015 stood at 958 (Kama, 2006; Adeusi and Oke, 2013; CBN, 2015a).

3.4.2.1 Assessment of Banking Sector Performance

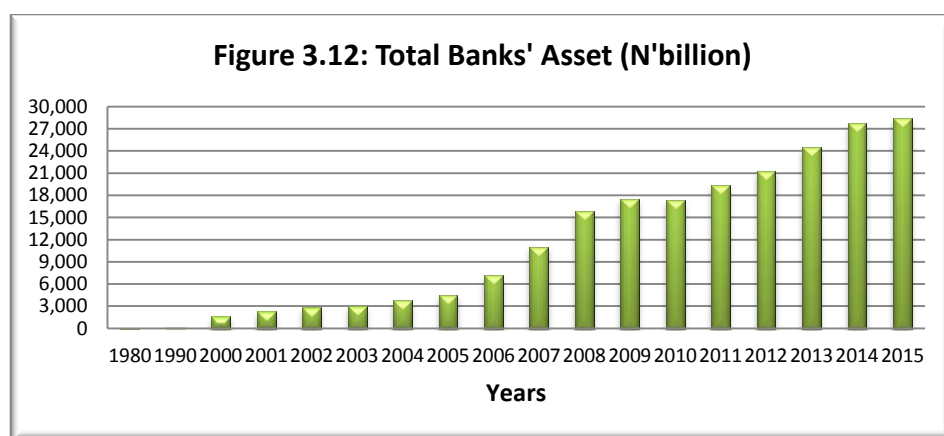
Looking at some performance indicators of the banking sector - total assets; currency ratio; savings ratio; as well as credit, to look at a few – the performance of the Nigerian banking sector has been very impressive.

3.4.2.1.1 Banking Sector Asset

As at 1986, banking sector asset stood at ~~N~~39.7 billion and went up to as high as ~~N~~694.6 billion in 1998 after the introduction of the SAP and the liberalisation of the sector. Total asset of the sector continued to grow steadily and substantially to ~~N~~15,919.6 billion in 2008 from the level in 1998. By the end of 2015, total banking sector asset had grown to ~~N~~28,117.6 billion, a large portion of which was in loans and advances (CBN, 2015 a & b). Total banking sector asset base, including the CBN, grew from ~~N~~1.6 billion in 1970 to ~~N~~954 billion in 1995; ~~N~~4,322.4 billion in 2001; ~~N~~7,155.6 billion in 2004 and ~~N~~16,435.3 billion in 2006. By 2010, the total asset of the banking sector had grown to ~~N~~24,507.7 billion and subsequently to ~~N~~42,286.7 billion by the end of 2015. As of 2006, the CBN accounted for 60.2% of the total asset in the banking sector. Subsequently, its share in the total asset fell by 2010 and 2015 to 27.3% and 32.4%, respectively, while that of the DMBs increased, accounting for 70.7% and 67.1% within the same period (CBN, 2015 a & b). The increased share of DMB's asset in total banking sector asset was due to the 2004 banking sector consolidation, which made the banks bigger and more efficient to attract more investment.



Source: CBN (2015 a & b)

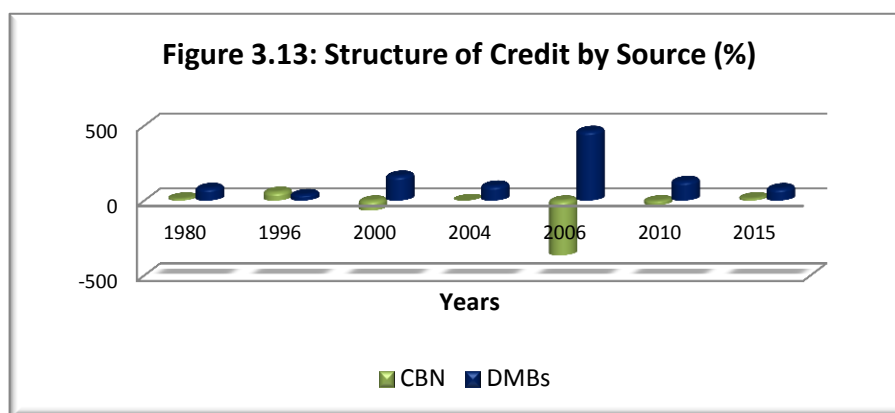


Source: CBN (2015 a & b)

3.4.2.1.2 Institutional Credit

A cursory look at the structure of institutional credit in the economy shows that the CBN accounted for about 50.0% - 60.0% of total credit between 1980 and 1996. After that, CBN's share of credit to the economy declined to negative 66.1% in 2000 and negative 365.4% in 2006. At this time, the CBN had reduced its ways and means advances to the government, and the government at the various levels had turned to DMBs for credit. On the other hand, the DMB's accounted for 166.1% of the total credit in 2000, 99.6% in 2004 and an all-time high of 465.4% in 2006; this was because of the 2004 banking sector recapitalisation and consolidation exercise, which made the banks have more funds for credit creation. By 2010, the CBN's share was still negative at -30.5% while; the DMBs contributed

130.5% of the total credit to the economy. By the end of 2015, the DMBs had contributed 82.3%, with the CBN accounting for the balance of 17.7% (CBN, 2015 a & b).

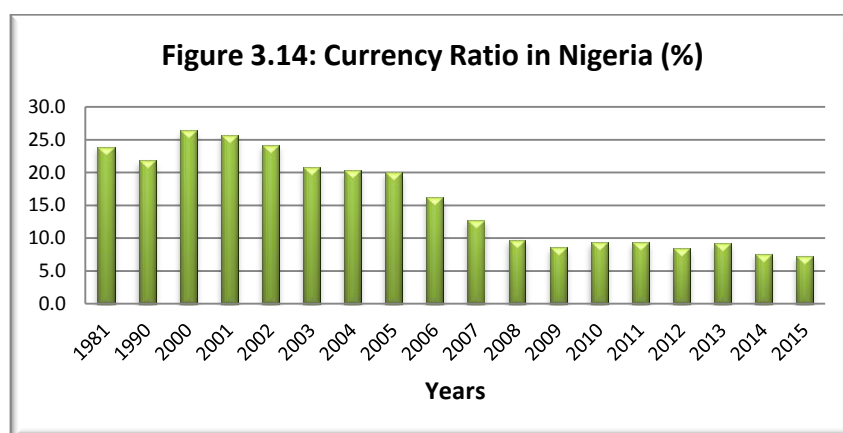


Source: CBN (2015 a & b)

3.4.2.1.3 Currency Ratio

The currency ratio, which is defined as the ratio of currency outside banks (COB) to broadly defined money supply (M_2), is a measure of how efficient the banking sector is at promoting banking habit (Maduka and Onwuka, 2013). During the early 1980's, the ratio was 23.9% in 1981 and declined to 20.9% by 1984. It resumed an upward trend by the 1990's to 26.4% and 29.1% in 1991 and 1993, respectively (CBN, 2015b). The upward trend of the currency ratio coincided with the period when there were several distresses within the system, which led to the loss of public confidence in the banking system (Maduka and Onwuka, 2013; Owolabi and Ogunlalu, 2013). The ratio continued to rise, as it increased to 33.9% by 1994. However, with the implementation of measures to combat the distress and the gradual restoration of public confidence in the sector, the ratio began to trend downwards to 29.8% in 1998 and 26.6% in 1999 (CBN, 2015b). Subsequently, it declined to 25.7% and 20.3% in 2001 and 2004, respectively. The implementation of the 2004 banking sector consolidation exercise and the completion of phase II of the exercise in late 2005 brought about the implementation of the cash-less policy, as well as the deployment of other electronic payments platforms (Point of sales

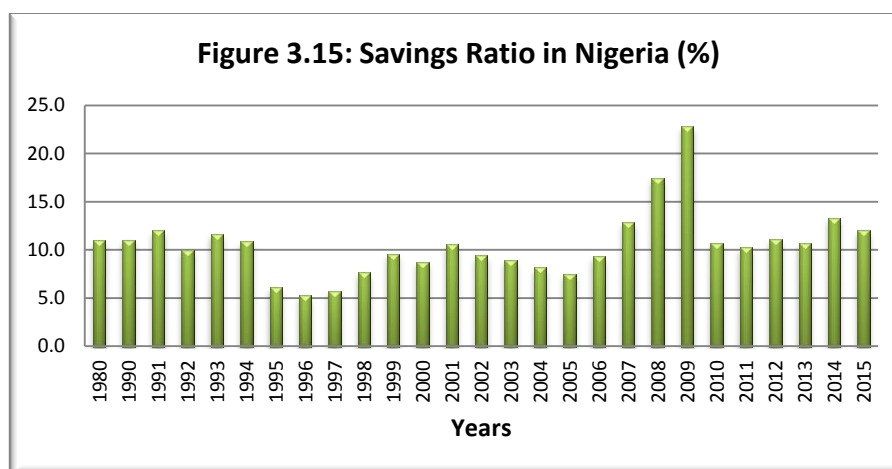
(POS) and Automated Teller Machines (ATMs)). This development led to a further decline in the currency ratio to 16.2%, 8.6%, 8.4%, 7.6% and 7.3% by 2006, 2009, 2012, 2014 and 2015, respectively, reflecting increased patronage of non-cash (electronic) payment methods (Maduka and Onwuka, 2013; Owolabi and Ogunlalu, 2013; CBN, 2015 a & b).



Source: CBN (2015 a & b)

3.4.2.1.4 Savings Ratio

Similarly, the savings ratio which shows how much savings was mobilised and made available for investment is another measure of the banking sector's performance. The savings ratio which was about 5.5% between 1970 and 1980, rose to 19.1% in 1986. During the distress in the banking sector and the loss of public confidence in the sector, which resulted in a decline in savings, the ratio trended downward to 3.0% in 1998 and averaged 6.9% between 1995 and 1999. Having put forth measures to address the issues within the sector, the ratio increased to 10.6% in 2001 and 22.8% in 2009, due to substantial growth in foreign currency deposits. Subsequently, the ratio hovered around 10.7%, 13.2% and 12.0% in 2013, 2014 and 2015, respectively, in the aftermath of the global financial crisis (CBN, 2015 a & b).



Source: CBN (2015 a & b)

3.4.2.2 Bank Consolidation and Its Implications

The 2004 banking sector consolidation exercise was aimed at addressing the lingering problems of the banking system which had persisted over the years. These included: a poor capital base; high overdrawn positions with the Central Bank; over-dependence on public sector deposits; high incidence of non-performing loans; weak management and poor corporate governance; among others (Soludo, 2004; Sanusi, 2012; Inyang et al., 2014). Deposit money banks were required to consolidate their operations and increase their shareholders' funds to a minimum of ₦25.0 billion by end-December 2005. After the consolidation exercise, out of the 89 banks that existed as at end-December 2004, only 25 remained at the end of 2005. 14 banks had their licenses revoked due to failure to secure a merger and inability to meet up with the minimum capital requirement. The mergers between the banks saw the number of DMBs drop to 24 in 2007 (Sanusi, 2012; Owolabi and Ogunlalu, 2013; Asekome and Abieyuwa, 2014).

The banking consolidation exercise was a major milestone in the banking sector, with its attendant benefits, as 93.5% of total deposit liabilities of the banking system was being accounted for by the successful banks. Also, in the process of the banks meeting up with the minimum capital requirement, ₦406.4 billion was raised from the capital market; and US\$652.0 million and £162,000 in foreign direct investment (FDI) was realised. Other benefits from the consolidation exercise,

which was a part of the overall government reform programme were (Ernest, 2012; Sanusi, 2012; Owolabi and Ogunlalu, 2013):

- Decline in interest rate due to high liquidity from the inflow of new funds into the banks. This resulted in increased lending to the real sector by as much as 40.0% by the end of December 2005.
- The banks could finance big-ticket transactions due to higher single obligor limits.
- Increased access to foreign credit lines.
- Curtailing of insider abuse and poor corporate governance as the ownership structure of the banks was diluted.
- Increased regulatory and supervisory oversight with the Securities and Exchange Commission (SEC) and Nigeria Stock Exchange (NSE) joining the regulatory team, since virtually all the banks were now publicly quoted.
- Increased depositor's confidence in the system.
- Increased economies of scale for the banks, which translated into reduced bank charges to their customers.
- Positive impact on the capital market as market capitalisation increased.

One of the important benefits that was derived from the 2004 banking sector consolidation exercise was that Nigerian banks became bigger and stronger, and were well positioned to withstand market and economic shocks (such as that experienced from the impact of the 2007/2008 global financial crisis). Having increased in size and asset base, the banks were exposed to increased cross-border transactions and the opening of bank branches in other African countries (Ghana, Benin Republic, The Gambia, Uganda, South Africa) and beyond Africa. They entered into various collaborations with foreign banks, raised huge equity capital and loans from the international financial markets through Global Depository Receipts (GDR), as well as invested in various forms of financial instruments abroad (Ogujiuba and Obiechina, 2011; Sanusi, 2012; Owolabi and Ogunlalu, 2013; Asekome and Abieyuwa, 2014).

In the aftermath of the global financial crisis, a joint special examination by the CBN and NDIC in 2009 showed that out of the 24 banks, 10 exhibited: substantial non-performing loan; weak corporate governance; weak capital adequacy; and illiquidity. This was due to their exposure to financial and trade transactions and financial instruments from other jurisdictions. During the joint special examination, it was found that the shocks transmitted by the crisis had negatively impacted these banks. Thus, to remedy the situation, the CBN initiated measures to strengthen the sector, protect depositors and creditors, and restore public confidence and safeguard the integrity of the Nigerian banking industry. The CBN proceeded to replace the chief executives and directors of the affected banks and injected the sum of ~~N~~620.0 billion (Tier II capital) into the banks to prevent a systemic banking crisis. Also, mechanisms were set in motion to recover non-performing loans from the banks' debtors while guaranteeing all foreign credits and correspondent banking commitments (Ogujiuba and Obiechina, 2011; Sanusi, 2012; Asekome and Abieyuwa, 2014). This led to the setting up of the Asset Management Corporation of Nigeria (AMCON).

3.4.2.3 The Asset Management Corporation of Nigeria (AMCON)

The 2007/2008 global financial crisis had seriously hit the Nigerian financial system, leaving in its wake serious consequences. The aftermath of the crisis led to the creation of a huge amount of toxic asset in the sector, which led the CBN to establish the Asset Management Corporation of Nigeria (AMCON) in 2010. AMCON was established to absorb the toxic assets of the banks that were either taken over by the CBN or had CBN's intervention, as well as to provide liquidity to the banks and assist them in re-capitalisation. From its inception to the end of 2015, AMCON had recovered a total of ~~N~~602.5 billion - cash recoveries ~~N~~252.9 billion and asset forfeitures ~~N~~349.6 billion (Adeusi and Oke, 2013; Maduka and Onwuka, 2013; CBN, 2015a).

From the foregoing, it could be seen that irrespective of the seemingly good performance of the Nigerian financial sector, the global financial crisis still created

a ripple in the sector through various shock mediums. Nigeria's economic growth and development in the last decade have to a large extent been influenced by massive inflows of venture capital, equity/portfolio and other foreign direct investments. Consequently, it was obvious that Nigeria could not be isolated from the shocks that were transmitted through the crisis. The impact of the shocks on the Nigerian financial system was not as direct or devastating as those of developed and emerging market economies. Those economies witnessed a near obliteration of the entire financial system because of their degree of integration with the global financial markets. However, when the impact of the crisis permeated Nigeria's financial system, the soundness and stability of the system were seriously threatened, prompting a decisive intervention by the Central Bank of Nigeria (CBN) and the Federal Government to mitigate the situation (Sanusi, 2010b).

The Financial sector was the hardest hit, of all the economic sectors, by the events that followed the crisis. The capital market recorded significant divestment as foreign investors, notably portfolio investors divested to meet their obligations back home in the face of the credit squeeze. Consequently, there was a continuous drop in the All-Share Index (ASI) as well as the volume of traded securities at the Nigeria Stock Exchange. Market capitalisation which was ₦13.0 trillion in September 2008 fell to ₦7.2 trillion at the end of first quarter 2009 (Sanusi, 2010b). The continued depression of the capital market led to higher loss provisioning by banks, owing to their significant exposure through margin lending and share backed collateral lending, which depressed profitability and weakened their ability to create loans. The contraction of bank's profit led to a retrenchment in some of the banks (Sanusi, 2010b). The impact of the shocks was transmitted into the banking sector through its excessive exposure to the capital market and the oil and gas sector. According to Njiforti (2015), the flight of hedge funds affected the banks. They were heavily exposed to the capital market through several shares linked loans to individuals, institutional and other types of investors. The sudden withdrawal of hedge funds created panic among exposed banks, which also

panicked in a bid to cut their losses from the exposure to the capital market as the Non-Performing Loan (NPL) ratio of the banks rose to 20.7% in 2009.

Bank's panic in the capital market was aggravated by the fact that most of them were exposed to foreign banks through international credits and guarantees. The foreign banks hit by the global meltdown suddenly recalled these loans and dropped their guarantees. This created a liquidity challenge for Nigerian banks, further compelling them to sell down their stocks to boost their liquidity. By the end of 2008, foreign investors had pulled out about ~~N~~556.93 billion, culminating in a net outflow of about ~~N~~406.8 billion (Njiforti, 2015).

3.4.3 The Fiscal Sector

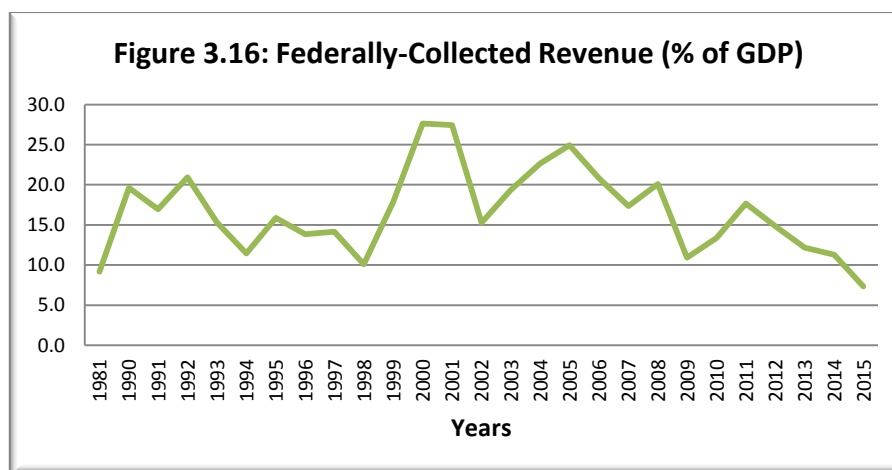
The broad categorisation of the Nigerian economy into oil and non-oil sector plays out in every facet of the economy, as government revenue is also classified into oil and non-oil revenue. Basically, non-oil revenue comprises mainly of taxes: customs and excise duties, personal income tax, company income tax and Value-Added Tax (VAT). The oil revenue is revenue generated from oil-related transactions such as crude oil sales, rents and royalties, as well as petroleum profit tax (PPT). Over the years, oil revenue has consistently been the major source of government revenue, accounting for over 70.0% of total federally-collected revenue (CBN, 2010a).

3.4.3.1 Federation Revenue

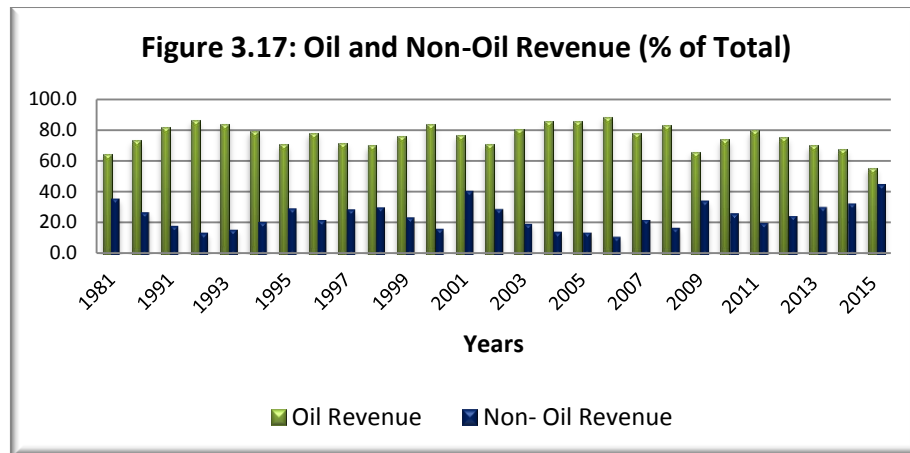
Total federally-collected revenue of the Federal Government received a substantial boost from its level in the early 1970's after the advent of crude oil, which significantly changed the structure of Federation Account revenue receipts. Total federally-collected revenue which was ~~N~~0.63 billion (12.2% of GDP) in 1970, increased to ~~N~~15.2 billion (30.0% of GDP) in 1980, but fell to ~~N~~12.6 billion (8.8% of GDP) by 1986, due to the glut in the international oil market (CBN, 2015b). Following the introduction of SAP, which brought with it the deregulation and liberalisation of some sectors, total federally-collected revenue resumed its upward trend. It went from ~~N~~27.6 billion in 1988 to ~~N~~463.6 billion in 1998, ~~N~~1,731.8 billion

in 2002 and subsequently to as high as ~~N~~5,619.5 and ~~N~~11,116.9 billion in 2005 and 2011. However, it declined marginally to ~~N~~10,654.9 billion in 2012, due to the disruptions of oil production by the Niger Delta militants and the impact of the global financial crisis on the world economies (CBN, 2015 a & b).

Between the period 2011 to 2015, federally-collected revenue continued its decline to as low as ~~N~~6,912.5 billion in 2015, compared with ~~N~~10,068.9, ~~N~~9,759.8 and ~~N~~10,654.9 billion in 2014, 2013 and 2012, respectively (CBN, 2015b). The continued decline in federally-collected revenue was attributed to persistent disruptions of oil production activities in the Niger Delta region, the lingering effect of the 2007/2008 global financial crisis and the accompanied crash in crude oil price in the international market. Concerning the GDP, total federally-collected revenue as a percentage of GDP which was 9.2% in 1981, rose to 10.2% in 1987 and 19.6% in 1990. By the years 2000, 2001, 2004, 2005, 2006 and 2008 it had risen to as much as 27.6%, 27.4%, 22.6%, 24.9%, 20.8% and 20.1%, respectively. Subsequently, its proportion assumed a downward trend as it went to as low as 7.3% by 2015 (CBN, 2015 a & b).

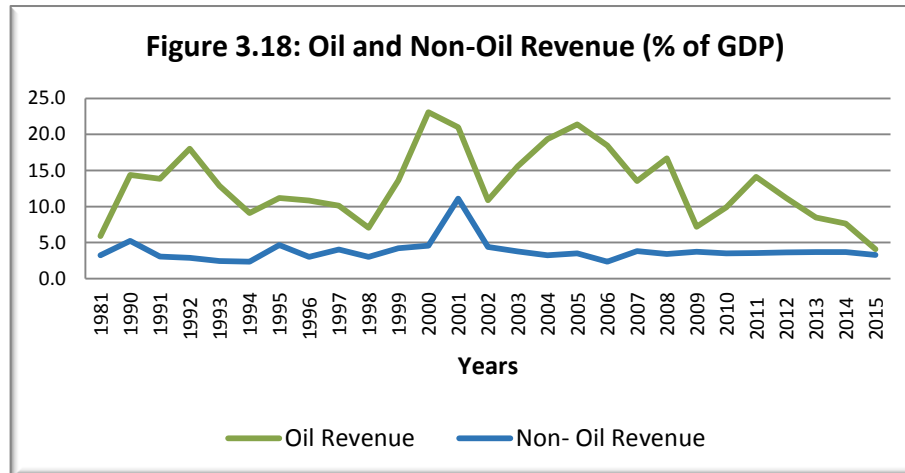


Source: CBN (2015 a & b)



Source: CBN (2015 a & b)

Non-oil revenue which was ₦4.7 billion in 1981, increased to ₦6.4 billion in 1987. Its share in total federally-collected revenue averaged 30.4% between 1981 and 1985 (CBN, 2015b). The advent of crude oil in the early 1970's and the upsurge in crude oil exports and other oil receipts negatively impacted the contribution of the agricultural sector (which was a major driver of non-oil). This, in turn, affected its contribution to non-oil revenue and consequently total federally-collected revenue. In the 1990's, non-oil revenue sources received a boost following the implementation of port reforms; the value-added tax (VAT) and performance incentives for revenue collecting agencies (CBN, 2010a). Non-oil revenue increased from ₦4.5 billion in 1986 to ₦166.0 billion in 1997 and ₦314.5 billion in 2000. The upward trend continued in 2005 to ₦785.1 billion and ₦1,264.6 billion in 2007, and further to ₦3,275.0 billion and ₦3,082.4 billion in 2014 and 2015 (CBN, 2015 a & b).



Source: CBN (2015 a & b)

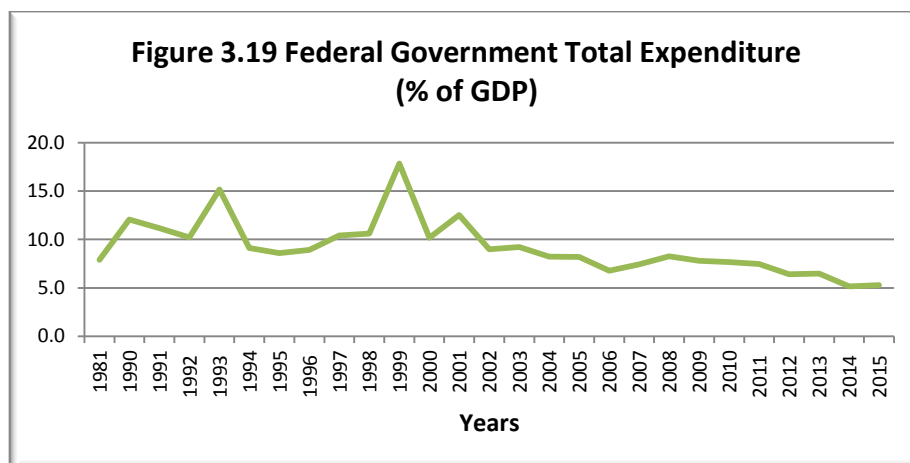
On the other hand, oil revenue which averaged ₦8.5 billion (68.7% of the total revenue) between 1981 and 1986, increased to ₦71.9 billion (73.3%) in 1990 and ₦416.8 billion (71.5%) in 1997 (CBN, 2015b). By 1998, due to the fall in international crude oil price, oil revenue declined to ₦324.3 billion (70.0%). The share of oil revenue in total revenue maintained its level over the years as it continued to increase due to increased quota allocation by OPEC and other favourable developments in the international crude oil market. From ₦724.4 billion (76.3%); ₦1,591.7 billion (83.5%) and ₦1,707.6 billion (76.5%) in 1999, 2000 and 2001, respectively, it fell to ₦1,230.9 billion (71.1%) in 2002 following a cut in OPEC's quota. The persistent rise in crude oil price in the international market in the period 2003 to 2007, boosted oil revenue markedly. Crude oil price went from an average price of US\$29.1 per barrel in 2003 to an unprecedented level of about US\$90.5 per barrel in 2006 and 2007 (CBN, 2015b).

Oil revenue continued to maintain its upward trend from ₦2,074.3 billion (80.6%) in 2003 to ₦3,354.8 billion (85.6%) in 2004 and ₦4,762.4 billion (85.8%) in 2005. However, it declined from ₦5,287.6 billion (88.6%) in 2006 to ₦4,462.9 billion (77.9%) in 2007, due to the reduction in production output below the allocated OPEC quota resulting from the Niger Delta crisis, though it still maintained its share in total Federation Account Revenue (CBN, 2015b). It continued to hover around an average of ₦6,182.1 billion between 2008 and 2015. From ₦8,879.0 and

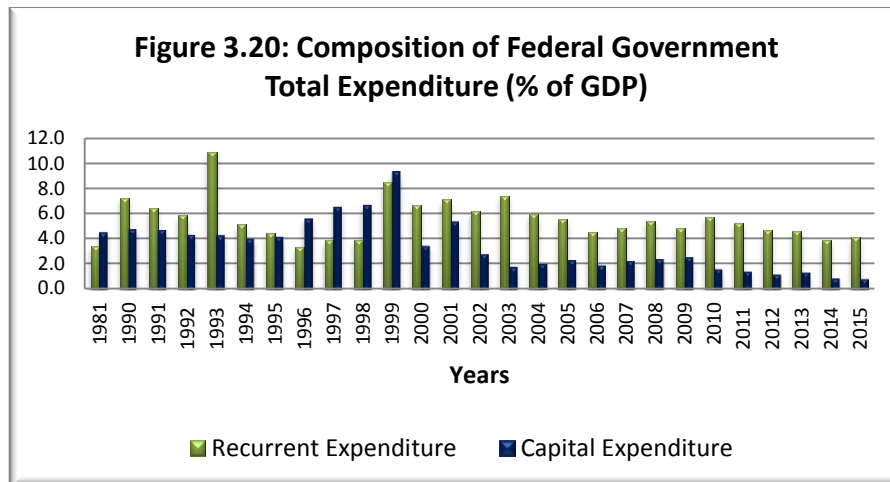
~~₦~~8,026.0 billion in 2011 and 2012, it declined to ~~₦~~3,830.1 billion in 2015 because of the crash in international crude oil price and the reduction in production output in the same period. International crude oil price which average of US\$113.8 and US\$113.7 per barrel in 2011 and 2012, fell to an average of US\$58.5 per barrel in 2015 (CBN, 2015 a & b).

3.4.3.2 Federal Government Expenditure

The total expenditure of the Federal Government averaged ~~₦~~15.2 billion between 1980 and 1988. By 1989, it jumped to as high as ~~₦~~41.0 billion and ~~₦~~60.3 billion in 1990 (CBN, 2015b). The huge increase in Federal Government total expenditure from its level in 1989 was driven by the high inflation, the exchange rate depreciation, and the settlement of government obligations, as well as external debt service (CBN, 2010a). From 1991 the total expenditure grew at an average rate of 33.9% per annum to ~~₦~~947.7 billion in 1999. With an annual average growth rate of 11.8% between 2001 and 2014, the upward trend was sustained over the period. Thus, from ~~₦~~1,018.0 billion in 2001, it rose to ~~₦~~1,822.1 billion in 2005, ~~₦~~3,453.0 billion in 2009 and peaked at ~~₦~~5,185.3 billion in 2013. By 2015, it declined marginally to ~~₦~~4,988.9 due to the decline in government revenue (CBN, 2015 a & b).



Source: CBN (2015 a & b)



Source: CBN (2015 a & b)

The main external shock that affected the operations of the Federal Government through the global financial crisis was the international crude oil price. The near-total reliance of the Federal Government on crude oil exports for government revenue and foreign exchange earnings was highlighted during the period. The decline in foreign exchange earnings led to a reduction in revenue and expenditure profiles of the three tiers of government because of the steady fall in the monthly allocations from the Federation Account. The wider implication of this was the cut in the implementation of government projects. The financing of capital projects was being limited to the priority sectors, leading to the non-realization of key government programmes such as the Millennium Development Goals (Sanusi, 2010b). The sharp drop in oil revenue reversed the few years of fiscal surpluses to severe deficits. The fall in oil price also had implications for oil revenue as well as borrowing. Federal Government total revenue which recorded a growth of 34.0% in 2008, flipped into a contraction of about 38.0% in 2009 (over 72 percentage points difference) – the highest decline recorded since 2000. This was because the oil revenue which recorded a growth of 46.3% in 2008, had contracted by 51.6% in 2009 (a difference of over 97 percentage points), whereas, non-oil revenue growth which had slowed from over 77.0% in 2007 to about 11.0% in 2008, rebounded and recorded a growth of 23.7% in 2009 (Jenrola and Daisi, 2012).

With the oil revenue being the main source of revenue for the nation, the fall in oil price prompted the government to seek other sources of financing expenditure, as it could no longer rely on the earnings from crude oil exports. The fiscal operations of the Federal Government then relied heavily on funds raised through the issuance of FGN bonds. This led to the crowding-out of the private sector in the credit market, resulting in higher interest rates and other additional charges. The fall in government revenue necessitated the downward revision of government spending in the 2009 Federal Government Budget, which negatively affected the welfare programmes and government plans to build and renovate dilapidated infrastructure (Sanusi, 2010b). Government's at all levels cut down on budget and social spending. Faced with revenue constraints and shortfall in foreign exchange earnings, debt at all tiers of government increased significantly. Total debt grew by over 32.0% in 2009 after recording a decline of 39.9% in 2008, and it has continued to grow but at a declining rate since 2011. While domestic borrowing which declined by 46.1% in 2008 recorded a growth of 36.4% in 2009, external borrowing fell from 21.0% in 2008 to 12.0% in 2009. This was because most of the world economies were overwhelmed by the same shocks that were transmitted by the crisis and could not lend to fellow nations (Onuoha and Nwaiwu, 2016).

3.4.4 The External Sector

The external sector basically deals with the nation's international economic transaction between the country and its residents, with the rest of the world. The sector's performance can be measured through: trade integration, financial integration, economic competitiveness, external asset position, the level of external reserves, current account balance, capital and financial account position, and the net position in international investment. The external sector is quite important because it is a measure of the degree of vulnerability or exposure of the economy to external shocks. An economy that has a high degree of dependency on the rest of the world or that is largely driven by global economic conditions is external sector driven and highly prone to external shocks. The Nigerian economy is a typical example of such an economy as it is highly dependent on imports for most

goods and services, as well as crude oil sale for her foreign exchange earnings. Thus, for Nigeria, the efficient management of the external sector and international economic conditions have implications for macroeconomic policies, price stability, output performance and poverty reduction.

External sector transactions/activities are captured in the Balance of Payments (BOP) and the International Investment Position (IIP). In the BOP, the interest in trade leads to an assessment of the current account which gives information on the value of goods and services traded with the rest of the world, interest earned on investments and remittances from Nigerians in diaspora (IMF, 2009). Other transactions will be assessed through the capital and financial account which gives the net position of financial flows in the form of foreign direct and portfolio investments, long-term borrowing and other investment liabilities (IMF, 2009). On the other hand, the IIP shows the value and composition of financial assets of residents of an economy that are claims on non-residents and gold bullion held as reserve assets, and liabilities of residents of an economy to non-residents (IMF, 2009).

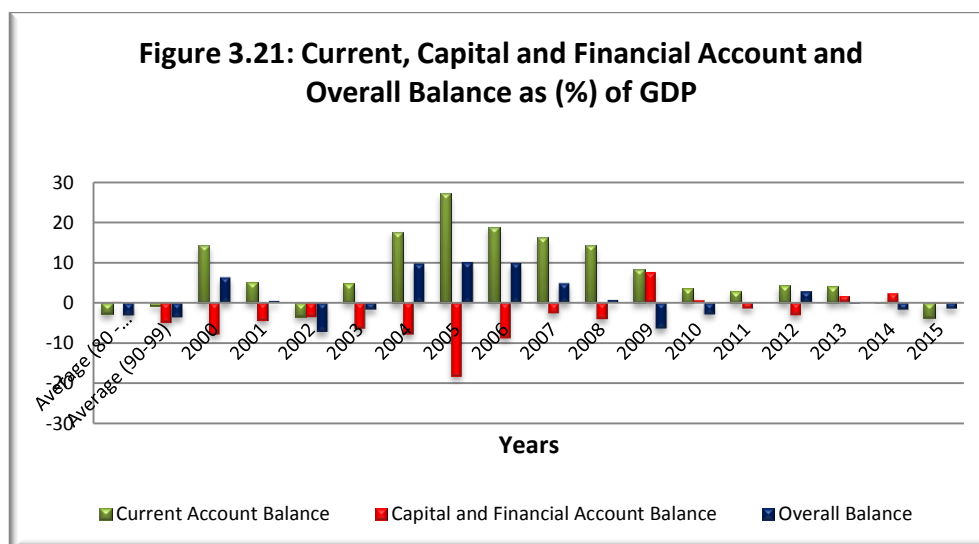
3.4.4.1 The Balance of Payment (BOP)

Nigeria's Balance of Payments position has continuously reflected the challenge of the economy in managing the high domestic demand for foreign goods and services, in the face of inadequate foreign exchange earnings. Consequently, this has resulted in persistent deficits over the years, which intermittently revert to a surplus position in response to positive crude oil shock in the international market and at times to domestic policies.

Throughout the period 1980 to 1985, the nation recorded BOP surpluses that were occasioned by huge trade arrears. However, BOP deficits resurfaced between 1986 and 1989, with some moderation in 1990. It worsened between 1991 and 1998, after the introduction of SAP, which came with its negative impact on the economy (CBN, 2015b). By 1999, the pressure on the BOP persisted as the overall

deficit expanded through to 2003, except for 2000 and 2001 (CBN, 2015b). The increase in crude oil export proceeds from favourable developments in the international oil market and favourable macroeconomic fundamentals reduced the pressure on the BOP position, as huge surpluses were recorded.

The global financial crisis took its toll on the BOP position as the deficits re-appeared. The adverse effect of the global financial crisis, coupled with the crash in international crude oil prices, slowdown of the Chinese economy, weak global demand and the United States monetary policy normalisation, resulted in deficits in the BOP position between 2009 and 2011 (Tijani, 2014; Imoughele and Ismaila, 2015). This was reflected in the significant drawdown on external reserves, portfolio capital reversal (sudden stop) and lower trade surpluses recorded during the period. The lingering effect of the global financial crisis persisted throughout the period 2013 to 2015, as the external sector remained under pressure with the BOP position deteriorating progressively (Tijani, 2014; CBN, 2015 a & b; Imoughele and Ismaila, 2015).



Source: CBN (2015 a & b)

3.4.4.2 Current Account

Throughout the 1980's and 1990's, the current account recorded surplus balances because of positive terms of trade shocks, occasioned by the oil boom resulting

from the Arab oil embargo on the U.S. (Egwaikhide, 1999). The positive trend in the current account was maintained up till 2014. The impressive development was due to positive developments in the international crude oil market and huge inflow of unrequited transfers (mainly home remittances). By 2015, the surpluses enjoyed over the past years was interrupted as the current account position weakened, resulting in a deficit, which was mainly driven by the shock from the global financial crisis (Tijani, 2014; Imoughele and Ismaila, 2015). The external shock that resulted from the global financial crisis led to adverse trade shock, a slump in crude oil prices at the international market and lowered export. Over the review period, the poor performance of non-oil export and the fluctuations in international crude oil prices were responsible for the pressure on the current account. Other culprits were the persistent deficits in the services and income accounts and the low level of unrequited transfers from abroad (Tijani, 2014; Imoughele and Ismaila, 2015).

3.4.4.3 Export

Before the 1980's, Nigeria's export was mainly primary produce with little or no value addition, basically made up of non-oil agricultural produce like cocoa, groundnut, cotton and palm produce. The advent and subsequent export of crude oil changed Nigeria's export composition, as the proportion of crude oil export in total export grew remarkably to become the dominant export commodity. During the period 1981-1985, crude oil export accounted for an average of 96.7% of total export, and an average of 97.3% in the period 1986-1998 (CBN, 2015b). The share of crude oil export in total export continued to grow, as it increased to an average of 97.4% between the periods 1999 to 2004 (CBN, 2015b). However, its share began to reduce after the discovery of natural gas in commercial quantity and its export from 1999. Although gas export had commenced in 1999, its contribution to total export was insignificant until 2005. By the year 2005, gas export accounted for 5.5% of total export and increased to 11.4% in 2008. Its share in total export increased consistently to an average of 10.0% between 2009 and 2013, 12.6% in 2014 and 14.2% in 2015 (CBN, 2015 a & b). Consequently, the share of crude oil

export in total export fell to an average of 88.0% between 2005 and 2010, and further to 81.1% during 2011-2015 (CBN, 2015 a & b).

The advent of crude oil and natural gas in commercial quantity and their subsequent inclusion in the export basket affected non-oil export. During the period 1981-1985, the share of non-oil export in total export which stood at an average of 3.3%, declined to an average of 0.9% between 1986 and 1998, and was an average of 2.1% between 1999 and 2006, from its level in the period 1981-1985 (CBN, 2015b). In the bid to salvage the sector and increase its share in total export, the government reeled out several strategic initiatives to enhance value added in domestic production for export. This resulted in improved production, processing and packaging of semi-manufactured, agricultural and manufactured products (Tijani, 2014; Imoughele and Ismaila, 2015). Consequently, the share of non-oil export in total export increased to an average of 4.9% during the period 2007-2010, an average of 6.6% between 2011 and 2014, and 7.5% by 2015 (CBN, 2015 a & b). Despite all the initiatives to increase the share of the sector in total export, its performance remained largely unimpressive.

The value of Nigeria's total export, like its composition, has been largely driven by oil export. The value of total export which averaged ~~N~~2,428.6 and ~~N~~7,235.1 million between 1970 - 1974 and 1975 - 1979, respectively, rose to ~~N~~14,186.0 million in 1980, due to enhanced receipts from crude oil export (resulting from the sharp increase in international crude oil price) (CBN, 2015b). The subsequent crash in crude oil price occasioned by the glut in the international oil market, led to a steady decline in the value of total exports to ~~N~~11,023.3, ~~N~~8,206.4 and ~~N~~7,502.5 million in 1981, 1982 and 1983, respectively (CBN, 2015b).

The rebound in international crude oil price saw a huge increase in the value of total export to as high as ~~N~~218,801.1 million in 1993 and ~~N~~1,128.3 billion in 1996 (CBN, 2015b). This does not leave out the effect of the exchange rate, as the exchange rate during the review period was quite favourable. By 2001, the total

value of export rose to ~~N~~2,001.2 billion, from its previous level of ~~N~~689,077.9 million in 1998 (CBN, 2015b). The upward trend in the value of total export continued as long as developments in the international crude oil market, and the exchange rate remained favourable. The value of export had risen to ~~N~~4,602.8 billion in 2004; ~~N~~7,246.5 billion in 2005 and increased by 12.1% to ~~N~~8,309.8 billion in 2007. Between 2008 and 2010, the value of export averaged ~~N~~10,165.5 billion and increased significantly by 49.7% to an average of ~~N~~15,214.2 billion during the period 2011-2013. By the time the economy started to feel the full impact of the shock from the global financial crisis, it fell to ~~N~~12,989.8 billion in 2014 and subsequently to ~~N~~9,016.3 billion in 2015 (CBN, 2015 a & b).

3.4.4.4 Import

Over the years, non-oil import had remained dominant, accounting for an average of 85.0% from the 1960s through 2000. There had not been any significant shifts with respect to the structure or composition of import (Egwaikhide, 1999; CBN, 2010a). However, from 2001 to 2010 and between 2011 and 2015, the share of non-oil import in total import declined to an average of 78.5% and 75.9% (CBN, 2015 a & b).

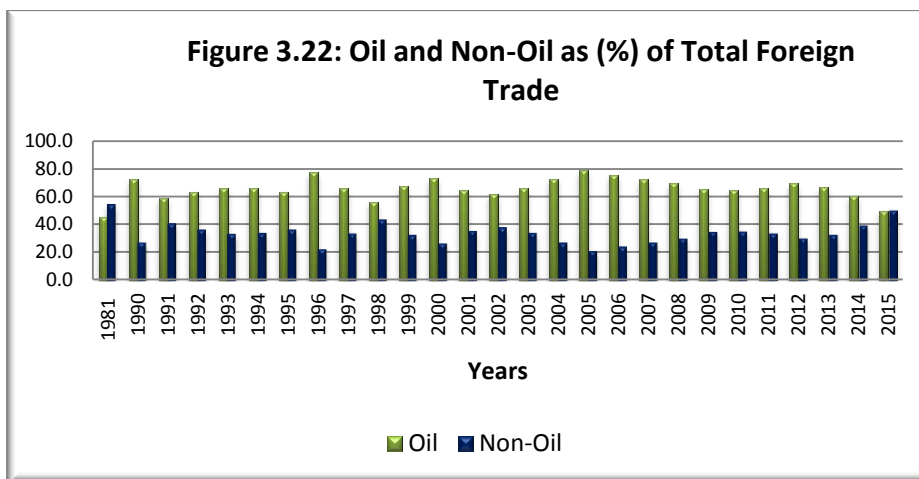
Conversely, the share of oil import in total import had been quite low in the 1960's, 1970's and 1980's due to the existence of functional refineries in the country (Egwaikhide, 1999; CBN, 2010a). For instance, the share of oil import in total import averaged 1.9% during 1980-1985. However, from 1986 to 1995 and between 1996 and 2006, it rose to an average of 19.8% and 22.2% (CBN, 2010a; CBN, 2015b). The increase was attributable to the fall in the refining capacity of domestic refineries, resulting from shutdowns due to lack of maintenance. The upward trend continued through 2006 and 2014, with an average of 24.4%, as the problem persisted. Through government intervention and reforms in the oil and gas sector, which resulted in the revival of domestic refineries and increased local refining capacity, it dropped to 15.6% in 2015 (CBN, 2015 a & b).

The value of total imports stood at ~~N~~11,726.8 million in 1981, from an annual average of ~~N~~1,121.3 million from 1970-1974 and ~~N~~5,922.9 million in 1975-1979. The huge increase in total imports in 1981 over the previous periods was because, after the discovery of oil and increase in income from crude oil sales, there was an increased preference for foreign goods (CBN, 2010a; CBN, 2015b). However, the implementation of restrictive demand management measures under the economic stabilisation policy of 1982, resulted in it declining to ~~N~~5,476.6 million in 1986. The upward trend in the value of total import resumed from 1987 to 2007, as it went from ~~N~~16,392.5 million in 1987 to ~~N~~3,559.9 billion in 2007, with a few declines recorded in 1994 and 1996. Within the period 2008 and 2015, it averaged ~~N~~8,062.9 billion (CBN, 2015 a & b). The resumed upward trend was attributable to the availability of cheap imports, the effect of the prevailing exchange rate and an increase in the tempo of economic activities occasioned by the positive impact of the economic reforms. This upward trend also reflected in the total import bills, as it averaged US\$5,899.0 million between 1986 and 1998 and US\$18,172.9 million between 1999 and 2007. During the period 2008 to 2015, the value of total import bills increased significantly and averaged US\$51,706.61 million. The increase in the value of total import bills was due to the rehabilitation and construction of infrastructure in the country, as well as increased domestic demand for both producer and consumer goods from abroad (Imoughele and Ismaila, 2015).

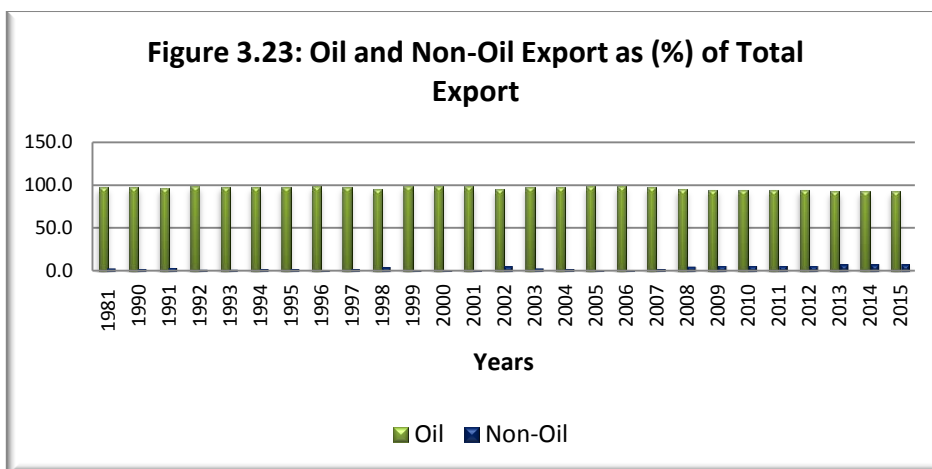
3.4.4.5 Foreign Trade

The nature of foreign trade in Nigeria also depicts the two-broad categorisation of the economy into the oil and non-oil sectors. The oil sector dominates foreign trade; it accounted for over 60.0% of total external trade over the period 2006 - 2014. During the period 2006 – 2015, over 90.0% of total export receipts were accounted for by oil exports, while non-oil exports accounted for the balance. On the other hand, total import is dominated by non-oil imports, accounting for the greater share of over 70.0% of total import over the period 2006 – 2015. The share of export and imports in GDP in 2011 was 24.2% and 17.5%; respectively, however, these figures declined in 2015 to 9.6% and 11.8%. Statistics also show

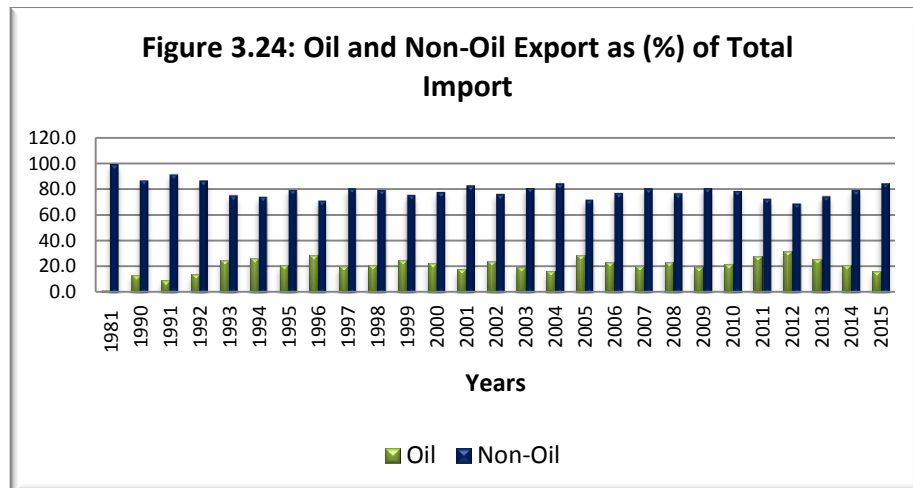
that total trade accounted for 41.7% and 21.3% of GDP in 2011 and 2015 (CBN, 2015 a & b).



Source: CBN (2015 a & b)



Source: CBN (2015 a & b)



Source: CBN (2015 a & b)

The Nigerian economy has a high level of external dependence, and this is evident in the structure of the country's external trade. The oil sector, with its attendant volatility, is still the dominant source of foreign exchange earnings for the country and imports (particularly consumer goods) is still on the rise over the years due to the high taste for imported goods. This structure and high level of external dependence have made the economy highly vulnerable to external shocks.

3.4.4.6 Trade Balance

Nigeria recorded deficits in her trade balance during the 1960's and the early 1970's, resulting from the acquisition of capital goods from the rest of the world in the form of machinery. The acquisition of these capital goods was to stimulate the industrial development and provide infrastructure during the period (CBN, 2010a). The advent of crude oil and the commencement of crude oil export helped the country to record trade surpluses in most years, with the exception of the years when there was a crash in international crude oil price. For instance, the country recorded deficit balances from 1981 to 1983, which averaged ₦430.1 million because of the high import bills and a slump in the international crude oil market (CBN, 2015b). On the positive side, from 1984 up to 2015, Nigeria recorded surplus trade balances, even in the face of the shocks transmitted through the global financial crisis, which led to adverse developments in the global economic environment.

3.4.4.7 Capital and Financial Account

The capital and financial account have been the main channel through which the deficit in the current account has been financed. Especially since the early 1980s, these deficits have been either financed through drawdown on loans or debt service deferment. Short-term capital only came into prominence in about 1982, when Nigeria accumulated huge trade arrears in the process of financing balance of payments deficits. However, after the banking sector reform (consolidation) in 2005 and the 2007/2008 global financial crisis, the use of short-term capital resurfaced, as global capital moved to develop economies for safety and higher interest earnings (CBN, 2010a; Tijani, 2014; Imoughele and Ismaila, 2015).

Prior to the 1980's, the capital and financial account did not experience much pressure because of adequate inflow of foreign capital, as against the relatively lower level of capital out payments. But from 1980-1985, because of a decrease in the level of direct investment funds and the accumulation of new loans, the capital and financial account witnessed significant pressures. The pressure on this account persisted through the SAP years, resulting in continuous and expanding deficits, with an exception in 1994 when there was a surplus from an increase in suppliers' credit. The persistent pressure reflected the high debt amortisation and the inability to raise funds to cover the deficit in the BOP (CBN, 2010a; Imoughele and Ismaila, 2015).

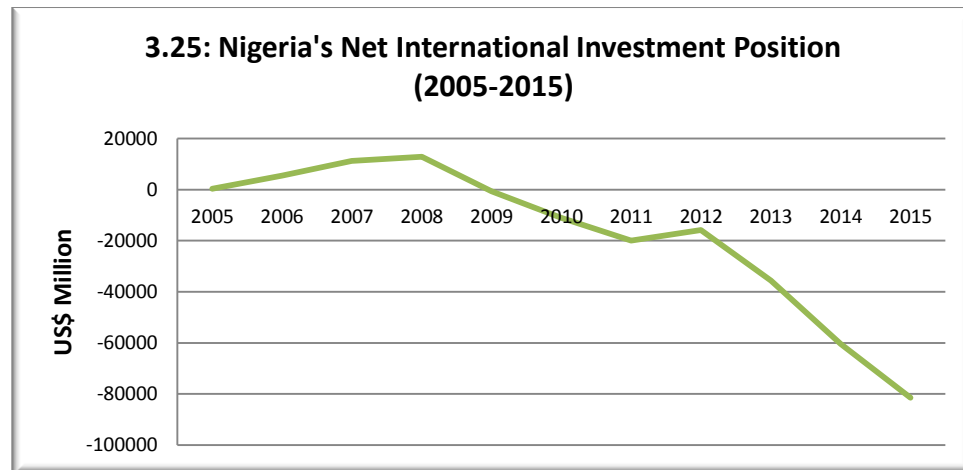
Investor's renewed confidence in the economy after the banking sector reform and the vibrancy in the capital market increased foreign direct investment (FDI) and portfolio inflow, which translated into a surplus in the capital and financial account in 2009. By 2011 and 2012, increased investment abroad (acquisition of financial assets and increased holdings of currency and deposits) resulted in a net outflow. However, a net inflow of US\$7,748.8 and US\$12,286.2 million was recorded in 2013 and 2014, due to increased inflow of portfolio investment. But by 2015, the improvement recorded in the previous years was reversed, as a net outflow of

US\$1,027.91 million in financial assets was recorded. The outflow resulted from the U.S. monetary policy normalisation in 2015 (CBN, 2015 a & b; Tijani, 2014; Imoughele and Ismaila, 2015). Inflows into the Nigerian economy over the years have been largely influenced by the massive reform programmes implemented by the government. It has also been influenced by global economic conditions which made most developing economies and emerging market economies a safe destination for capital.

3.4.4.8 International Investment Position (IIP)

The International Investment Position (IIP) presents a picture of the level of external exposure of a country in financial assets and liabilities with the rest of the world. The Asian financial crisis in the 1990's gave birth to the compilation of the IIP as an early warning signal indicator against potential external vulnerability (external shocks), resulting from global financial integration. Nigeria started compiling the IIP in 2005 and came up with a preliminary IIP statement prepared for 2005 to 2007. The preliminary IIP statement for 2005 to 2007 presented the country as a net creditor against the rest of the world (also in 2008). This followed a surplus net IIP position, which resulted from the huge accumulation of external reserves over external liabilities (CBN, 2010a; Imoughele and Ismaila, 2015).

Nigeria registered an average deficit or liability of US\$27,647.0 million in her net IIP during the period 2009 to 2015, because of the huge capital inflow from the developed economies, due to the lingering effect of the global financial crisis. The continuous inflow of foreign capital and depletion of the external reserves perpetuated the negative position of Nigeria's net IIP up to 2015 (US\$55,022.7 million), making the country a net debtor to the rest of the world (CBN, 2015 a & b). The development in the IIP accentuates the degree of financial integration of Nigeria with the global financial system, exposure to global economic conditions and level of vulnerability to external shocks.



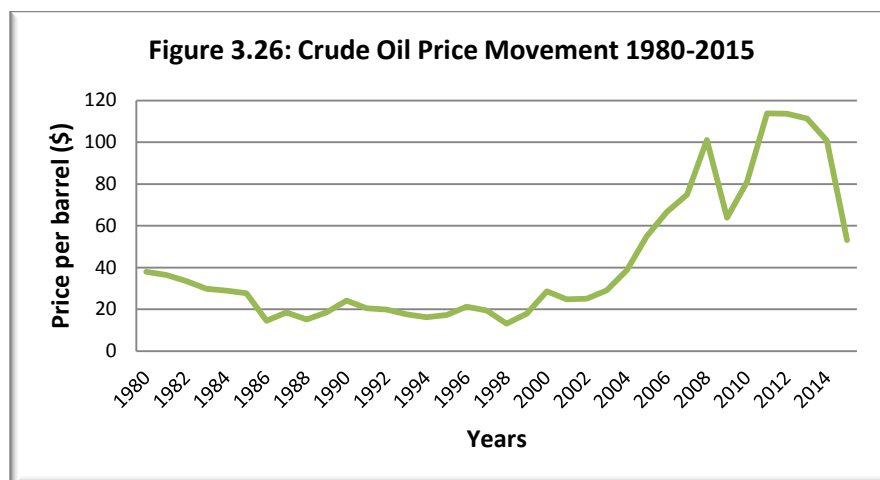
Source: CBN (2015 a & b)

3.4.4.9 Developments in the International Crude Oil Market

The international crude oil market has been characterised by frequent fluctuation in international crude oil price. This oil price volatility has serious implications for both global and domestic economic conditions, as well as various macroeconomic variables (output, inflation, exchange rate, external reserves, capital inflow, etc.).

During the period 1980 – 1989, crude oil price in the international market averaged US\$26.11 per barrel. It later dropped slightly to an average of US\$18.76 per barrel during the 1990's, before increasing again to an average of US\$26.92 per barrel from 2000 to 2003 (NNPC, 2015). However, from 2005, crude oil price began a steady upward trend and rose significantly above US\$40.0 per barrel. The upward trend in the international crude oil price persisted until it reached an unprecedented level of US\$147 per barrel in 2008. The persistent increase in international crude oil price was attributed to the energy crisis and increased global demand during the period. It declined to an average of US\$72.40 per barrel from 2009 to 2010 but rebounded to an average of US\$112.95 per barrel between 2011 and 2013 (NNPC, 2015; CBN, 2015a). In 2014, the average crude oil price remained high at US\$100.72 per barrel but slumped to an average of US\$58.5 per barrel in 2015 (NNPC, 2015; CBN, 2015a). The slump in crude oil price was driven by the low global demand in most developed countries who were recovering from the effect of the global financial crisis (particularly the slowdown in the Chinese economy). The slump was further attributed to increased global supply as a result of the

resumption of production by Iran and the entrance of the U.S shale oil into the international oil market, and huge oil inventory in Europe as well as the appreciation of the U.S dollar.



Source: NNPC Annual Statistical Bulletin (1997-2015) and CBN 2015a

Like most developing countries, Nigeria's external sector felt the effect of the global shocks transmitted through the financial crisis largely through trade and capital flows. This is because of the degree of openness of the economy and the dependence on crude oil exports for foreign exchange earnings. The crisis led to a de-accumulation of external reserves owing to the sharp fall in crude oil prices and the attendant decline in crude oil export earnings. The crisis also precipitated the decline in global financial flows to Nigeria in the form of foreign direct investment, portfolio investment, Oversea Development Assistance (ODA) and remittances because of the restriction by developed economies who were struggling to stabilise their economies. Thus, the prospect of contracting new concessional and non-concessional loans to bridge the financing gap was dimmed because of the global credit squeeze, (Sanusi, 2010b). The impact of the global shocks could further be traced through their effects on (a) the balance of payments through the narrowing of the current account balance (b) the widening of the deficit on the capital account through the reduction of capital flows, because of the re-appraisal of planned investment or the complete stoppage of previously committed investment

programs, and (c) contraction of the scope of fiscal policy (Ajakaiye and Fakiyesi 2009).

The most evident of the shocks on Nigeria's external sector was the adverse impact of the international crude oil price. The declines in oil prices and export volumes led to a decrease in export revenue. With exports falling faster than imports, the trade balance worsened in Nigeria. The expected merchandise exports before the crisis were USD 89.1 billion and USD 99.5 billion in 2009 and 2010, respectively, but after the crisis, the figures were revised to USD 50.4 billion and USD 55.3 billion. The current account balance also dipped into deficit in the amount of 9.1% of GDP in 2009, from a small surplus of 0.6% of GDP before the crisis (Ajakaiye et al., 2009). Since then, the current account is yet to attain the growth rate of over 147% recorded at the peak of the mortgage boom in 2005. The balance of trade although favourable, declined by 34.1% in 2009 from a growth of 12.1% recorded in 2008. Export recorded the worst fall in 2009 as it contracted by 17.7% from a growth of 22.3% in 2008, while import declined from 33.9% in 2008 to -2.32% in 2009 (Ujunwa et al., 2011).

The outflow of foreign investment from the economy contributed immensely to the collapse of the capital market. Foreign private investment which was rising at an increasing rate (2003-2007) fell drastically by losing the sum of ₦152,656,740,000 by the year-end 2008. This was because of the outflow of funds to protect the parent company's investment in the developed nations because most of the multinational companies in Nigeria are subsidiaries of the parent companies abroad (Njiforti, 2015). The exchange rate had been volatile since the crisis ensued. The official exchange rate showed that the Naira depreciated against the dollar by 25.6% (highest depreciation recorded since 2000) between 2008 and 2009, reflecting the demand pressure relative to supply with implications for the foreign reserve. Nigeria's external reserves which was strong before the time of the crisis dropped from USD62 billion in mid-2008 to USD42.4 billion in 2009 and USD32.3 billion in 2010 (Andrea, 2008; Yakubu and Akerele, 2012).

3.5 Measures to mitigate the Impact of the External Shocks

The impact of the shocks from the global financial crisis led to the contraction of some banks' balance sheets and huge economic losses. Consequently, the Federal Government of Nigeria and the CBN, having evaluated the impact of the shock from the second-round effect of the crisis on the economy, took several measures to restore the economy to its growth path and to also restore the confidence and efficiency of the banking system and the capital market.

To supplement government efforts, the CBN adopted quantitative easing measures to enable the country to cope with the impact of the shocks. Accordingly, the CBN conducted a stress test on the financial system (particularly the banking system), being the worst hit, to diagnose the degree and extent of the problem. It then embarked on an aggressive reform program to inject capital and liquidity into the banking system (recapitalisation of fragile banks). The CBN removed the chief executive officers (CEOs) of some banks, as well as prosecute those who committed some infractions so as to rescue eight (8) of the banks. Furthermore, the CBN established AMCON (the Asset Management Company of Nigeria) to take up toxic assets (to buy up bad loans) and reviewed the universal banking model. The sum of ₦620.0 billion (Tier II capital) was injected into the identified banks in the bid to prevent a systemic banking crisis; mechanisms were put in place to recover non-performing loans and all foreign credits and correspondent banking commitments was guaranteed by the CBN. The AMCON was established by the CBN as a resolution vehicle to deal with the non-performing loans of the banks and provide liquidity to the CBN-intervened banks (Sanusi, 2010 c & d; Sanusi, 2012).

Other measures were also adopted by the CBN to boost economic activities in the economy and support the real sector. To this end, the CBN set up various long-term funds at affordable interest rates to support industrial activities and infrastructural developments (Sanusi 2010d). The CBN set up a ₦500.0 billion fund to help bridge the infrastructure deficit gap and enhance credit to the real sector.

This was made up of ~~N~~300.0 billion for Power/Infrastructure projects and intervention in the Aviation sector, and ~~N~~200.0 billion for the Refinancing/Restructuring of banks' existing loan portfolios to manufacturers and small and medium enterprises (SMEs). The CBN also established a ~~N~~200.0 billion Commercial Agricultural Fund for the agricultural sector and another ~~N~~200.0 billion Credit Guarantee Scheme for SMEs. Similarly, ~~N~~150.0 billion credit facility was set aside for manufacturers through the Bank of Industry (BOI) and deposit money banks (DMBs), at a fixed rate of 7.0%. Furthermore, in February 2009, the government injected ~~N~~70 billion into the textile industry to revive ailing companies (Sanusi 2010d).

Additionally, the cost of bond issues was reduced to attract long-term foreign investors to invest in the real sector of the economy, as well as diversify funding sources away from the banks. In the bid to ensure that the DMBs remain safe, sound and healthy; the regulatory and supervisory framework was strengthened (consolidated supervision and risk-based supervision were adopted), while enhanced monitoring of their operations was intensified. The Financial Services Regulation Coordinating Committee (FSRCC) was revamped, while bank examinations were now being conducted jointly by the CBN and SEC. Greater emphasis was put on the enforcement of the code of corporate governance, as well as the enforcement of appropriate disclosures and zero tolerance on all unprofessional and unethical banking practice. Consumer and financial protection divisions were established in the CBN, and in the head offices and branches of DMBs to provide a platform through which consumers' complaints and other infringements are addressed (Sanusi 2010d).

According to Sanusi (2010d), by the end of 2010, the International Financial Reporting Standards (IFRS) was adopted in the Nigerian banking sector to reduce uncertainties and enhance market discipline, to strategically position the sector in the arena of global best practice in financial reporting and disclosure. Further measures to mitigate the impact of the shock from the global financial crisis and

reposition the Nigerian banking system included all banks adopting a common accounting year end and less reliability on rating agencies classifications. Also, conducting own-risk assessments; a 10 year tenor for banks' auditing firms; proper evaluation of credit instruments for easy assessment of associated risk; as well as a 10 year tenor of Chief Executives/Directors and 12 years for non-Executive Directors of Banks.

The CBN also implemented other remedial measures to mitigate the impact of the shocks on the economy. According to Sanusi (2010e), the CBN had to reduce the Monetary Policy Rate (MPR) from its level of 10.25% by September 18, 2008 to 6.0% by July 7, 2009, though it was raised marginally to 6.25% by September 21, 2010. In the same vein, the cash reserve ratio (CRR) was also reduced from 4.0% to 2.0% and further to 1.0%, while liquidity Ratio (LR) was reduced progressively from 40.0% to 25.0%. These remedial measures were to increase liquidity in the system and boost aggregate demand and consumption. The CBN expanded its discount window, making room for banks to borrow up to 360 days (currently suspended), as well as allow additional instruments.

Soludo (2009b) stated that, to manage the exchange rate in the heat of the crisis, the CBN had to suspend the Whole Sale Dutch Auction System (WDAS) that was in place to help manage the exchange rate, and revert to the Retail Dutch Auction System (RDAS) to check speculative demand for foreign exchange. Also, Bureau de Change operations was reclassified into two classes 'A' and 'B'; a band of (+/-) 3.0% was introduced to ensure stability; the inter-bank forex transactions were temporarily suspended; Net Open Position (NOP) of banks was reduced from 20.0% to 1.0%; while the list of transactions eligible under the RDAS window was revised and enlarged. Also, from March 16, 2009 the rates on the expanded discount window (EDW) were reduced to a maximum of 500 basis points above monetary policy rate (MPR), while the Banks and other Financial Institutions Act (BOFIA) was reviewed to strengthen regulatory capacity. In addition, the use of Electronic Financial Analysis and Surveillance System (e-FASS) was made

mandatory by the CBN as a tool for banks' returns analysis to enhance the speedy identification of early warning signals.

To also mitigate the impact of the effect of the shock on the Nigerian capital market, the SEC, the NSE and all capital market players had to reduce their fees by 50.0%. Also, trading rules and regulations were reviewed by the NSE, while there was a 1.0% and 5.0% maximum downward limit on daily price movement and on upward movement, respectively (later harmonized to 5.0% either way from end-October 2008). Further measures were the release of new guidelines/rules by SEC on market makers; 19 moribund companies were de-listed by the NSE; the NSE enforced strict listing requirement with zero tolerance for infractions; as well as a rule limit of 15.0% was set on share buy-back (Soludo, 2009a).

From the foregoing, by the time the shocks eventually hit Nigeria, the whole economy was not ready to absorb the impact of the shocks. Production in the real sector was below full capacity; infrastructure was inadequate; despite the recapitalisation of the banking sector, it was still ill-equipped to weather the storm. Government revenue declined, and there was a huge decline in aggregate demand as there was a credit crunch. Hence, the Nigerian economy, particularly the banking sector and the capital market was thrown into severe crisis as many of the banks became distressed and stock prices crashed.

3.6 Summary

This section has extensively reviewed the Nigerian economy, discussed the various sectors of the economy, as well as reviewed the impact of external shocks on the Nigerian economy as transmitted through the 2007/2008 global financial crisis. It also evaluates the measures put forth by the government and the Central Bank to combat the effects of these shocks. This section pulls together all the effects of the shocks that were transmitted into the Nigerian economy through the global financial crisis and show how the various sectors and sub-sectors were affected by the impact of the shocks.

From the review in this section, it could be said that this particular crisis accentuated the extent to which countries of the world are inextricably linked by globalisation, and it had widespread implications for countries of the world and Nigeria in particular. The high degree of interconnectedness of world economies through financial institutions and markets intensified the cross-border spill-overs, and external shocks were transmitted through these linkages. Nigeria was affected by the second-round effect of the crisis via financial, trade, remittances and aid channels. The country was highly vulnerable by its high degree of dependence on crude oil. The crisis exposed the inadequacies in the financial system and led to a systemic crisis in the Nigerian banking sector. The impact of the shocks manifested in the significant decline in federally collected revenue, reduction in export earnings, depletion of foreign reserves, reduction in capital inflows and divestment, the crash of the Nigerian capital market, increased foreign exchange outflow, and the contraction of foreign credits lines.

Chapter Four

Data and Research Methodology

4.1 Introduction

This chapter will focus on the methodology. The methodology will enable this research to attain the main objective of this study, which is to evaluate the impact of external shocks on Nigeria's output performance. In this chapter, the data source and the description of the variables used in the analysis are discussed. Subsequently, the empirical approach to be adopted in this study would be discussed and some statistical test conducted on the variables of interest and the model.

The objective of this empirical chapter is to adopt a methodological approach to examine the impact of external shocks on Nigeria's output performances and determine the contribution of each shock variables to the variations in the output performance. This objective would be accomplished through examining the long-run causal relationship between Nigeria's output performance and the selected shock variables using a multivariate vector autoregression (VAR) approach (Izquierdo et al., 2008; Gries et al., 2009; Sosa and Cashin, 2013). Furthermore, the study would examine the inter-relationships among the selected variables of interest using the generalised impulse response function (GIRF) and variance decomposition (VDC) analytic tools of the multivariate VAR. The variance decomposition or forecast error variance allows us to investigate the percentage of innovation contributed by each of the variables to the other variables in the VAR model. Similarly, the impulse response function (IRF) enables us to trace the time path of structural shocks in the VAR model (Sims, 1980). Since the seminal paper of Sims (1980) vector autoregressive models have become a key instrument in macroeconomic research.

The vector autoregressive model (VAR model) is used for multivariate time series analysis. The structure of the VAR is such that each variable is a linear function of

past lags of itself and past lags of the other variables (Sims, 1980). The VAR model is one of the most successful, flexible, and easy to use models for the analysis of multivariate time series. It is a natural extension of the univariate autoregressive model to dynamic multivariate time series. The VAR model has proven to be especially useful for describing the dynamic behaviour of economic and financial time series and for forecasting. It often provides superior forecasts to those from univariate time series models and elaborate theory-based simultaneous equations models. Forecasts from VAR models are quite flexible because they can be made conditional on the potential future paths of specified variables in the model (Sims, 1980; Izquierdo et al., 2008; Gries et al., 2009). In addition to the forecasting power of the VAR, the VAR model is also used for structural inference and policy analysis. In structural analysis, certain assumptions about the causal structure of the data under investigation are imposed, and the resulting causal impacts of unexpected shocks or innovations to specified variables on the variables in the model are summarised. These causal impacts are usually summarised with impulse response functions and forecast error variance decompositions (Sims, 1980; Izquierdo et al., 2008; Gries et al., 2009).

Once the VAR model has been specified and estimated, its estimated parameter values must be interpreted. It is worthy to note that, in the VAR models all variables depend on each other, and the individual parameter values only provide limited information (Sims, 1980). Thus, to get a better intuition of the model's dynamic behaviour, the impulse response function (IRF) is used. The impulse response function gives the reaction of a response variable to a one-time shock in an impulse variable. The trajectory of the response variable is then plotted, which results in those multiple wavy charts presented in most macro papers (Sims, 1980; Anderson, 2003). On the other hand, the variance decomposition (VDC) or forecast error variance decomposition (FEVD), which complements the IRF indicates the amount of information each variable contributes to the other variables in the autoregression (Sims, 1980). It determines how much of the forecast error variance

of each of the variables can be explained by exogenous shocks to the other variables (Sims, 1980; Anderson, 2003).

Sims (1980) uses the Cholesky decomposition framework to examine the time path of shocks. However, this framework has been criticised for its high sensitivity to the ordering of the variables in the VAR model. This framework is based on the premise of the orthogonality of the errors in the VAR system and the fact that the errors are contemporaneously uncorrelated with the standard errors. To resolve this ordering problem, Pesaran and Shin (1998) proposed the generalised impulse response function (GIRF), which would be adopted in this study. This approach is unique and quite simple to use, in that: It is invariant to the ordering of the variables, and it shows that the structural errors are correlated. Hence, a unit shock to one error affects other errors in the system.

Also, the study will use the vector error correction model (VECM) framework (a variant of the VAR model), which allows us to carry out two types of Granger causality tests. With the VECM, we can carry out the short-run Granger non-causality test and the long-run causality through the error correction term. As the study progresses, the results from both the VAR and VECM methodologies will be evaluated to see if there are any significant differences in the outcomes. This comparison is necessary because of the various debates in favour of the use of unrestricted VAR when cointegration has been confirmed amongst the variables in a system. Though most literature has supported the use of a VECM over the VAR when the variables in a VAR are cointegrated, each approach has its advantages and disadvantages depending on the analysis (short- or long-run analysis). Naka and Tufte (1997) note that the unrestricted VAR tends to outperform the VECM in the short-run because the estimates of the VAR are more accurate than those of the VECM.

Canova and de Nicolo (2000) also joins in support of the unrestricted VAR in that: it fairly approximates the data generating process of any vector of time series that

has the appropriate lag length, and it captures the dynamic feedbacks in the model in an unconstrained manner. However, despite all the advantages of the unrestricted VAR model, the VECM shows superiority in handling the long-run structural relationships in the model, which is ignored by the VAR. Phillips and Durlauf (1986) note that differencing (which is carried out in the VECM) is not necessary if the non-stationary variables are cointegrated, because, estimating a multivariate VAR model with such data will generate consistent parameter estimates. Also, that differencing of the data leads to loss of vital information about the series. Nevertheless, since our interest is in the dynamic interdependencies of the system, the impulse response functions, and variance decomposition will be used to account for the impact of the innovation.

4.2 Sources of Data

Macroeconomic data on the Nigerian economy abound from various sources, but each of these sources has its advantages and disadvantages. Macroeconomic data on the Nigerian economy is available from the Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS), the World Bank World Development Index (WB-WDI), and the International Monetary Fund - International Financial Statistics (IMF-IFS). The CBN is the apex regulatory authority of the Nigerian financial sector, while the NBS coordinates all statistical operations within the country to generate official country statistics in all the Federal Ministries, Departments and Agencies (MDAs), State Statistical Agencies (SSAs) and Local Government Areas (LGAs). The NBS in conjunction with the CBN produces most of the macroeconomic data for the country.

This study uses annual data for a sample period from 1981 – 2015 (34 observations). This period coincides with the period for which the revised and rebased GDP data is available for the country. The dataset consist of nine variables: real gross domestic product (RGDP), international crude oil price (OP), terms of trade (TOT), capital inflow (CI), US 10-year Treasury bond rate (USTB), government expenditure (GEXP), money supply (M2) and global financial crisis

(GFC). The study will also look at the impact of the shocks on the real non-oil gross domestic product (RGDP_N) since the real non-oil GDP accounts for about 80.0% of the total real GDP. The data for this research are obtained mainly from the Central Bank of Nigeria (CBN) and the International Monetary Fund - International Financial Statistics (IMF-IFS).

4.3 Methodology

To aid in the specification of the model for this research, the study leverages on past studies that has examined the impact of external shocks on the economy and various macroeconomic variables. Studies such as the works of Izquierdo et al. (2008), Aarle and Sosoian (2010), and Sosa and Cashin (2013) gave insight into the model specification and the variables to use. Specifically, Izquierdo et al. (2008) studied the role of external factors in the booms and busts cycles in Latin America. The authors used a vector error correction specification to assess the direct impact of external factors on the behaviour of output performance in 7 Latin American countries (LAC-7). They used a simple average of indices (GDP index) that reflected the seven largest Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela). These countries taken together account for about 93.0% of Latin American GDP. They used a set of external variables y_t which included proxies for changes in external demand, terms of trade, and international financial conditions. Their model was represented thus:

$$\Delta y_t = c + \alpha \beta' y_{t-1} + \Gamma \Delta y_{t-1} \dots + \Gamma_{p-1} \Delta y_{t-p+1} + \varepsilon_t \quad (1)$$

$$y_t = (gdp_lat_t, ip_x_t, tot_lat_t, finance_x_t, risk_t) \quad (2)$$

Where: *gdp_lat* is the log of LAC-7 GDP, *ip_x* is the log of an index of average industrial production in G7 countries, *tot_lat* is the log of an index of regional terms of trade, *finance_x* is the return on 10-year US T-bonds, and *risk* is the spread on high yield bonds over US T-bonds. In such a setting, changes in each of the variables in y_t depend on previous changes in all variables in the model, as well as on previous-period deviations from any cointegrating relation there may exist. In

their model specification, α is a matrix of the error correction adjustment coefficients, $\beta'y_{t-1}$ is the matrix of the error correction terms, matrices Γ_j contains the short run dynamics coefficients, and ε_t is a vector of reduced form shocks.

Aarle and Sosoian (2010) investigated the role of external factors in macroeconomic adjustment in Armenia. The authors focused on the role of exchange rate and monetary management and the inflow of remittances in the Armenian economy. This study is of special interest to our study, as we intend to introduce monetary and fiscal policy variables to capture the effect of domestic policies. Sosa and Cashin (2013) on the other hand evaluated the role of climatic and external shocks in macroeconomic fluctuations in the Caribbean. The authors used a country-specific VAR model with block exogeneity restrictions. The interest in this study is the nature of the variables used. They specified two external blocks within the model: one of the blocks contain climatic factors and foreign economic factors, while the other block is the domestic economic block. The authors used the variance decomposition from the VAR to assess the relative contribution of each of the external factors to the variance of the real GDP growth, while the response of domestic output growth to each of these external shocks is measured via the impulse responses.

These studies used different variables such as capital inflows, international crude oil prices, climatic conditions, and international real interest rates. Also, they used a measure of external demand, real output, real exchange rate, terms of trade, U.S. Treasury bond rates, international financial condition (e.g. the Emerging Market Bond Spread), as well as reserves to explain the sources of external shocks. This thesis will adopt some of these variables to investigate the impact of external shocks on Nigeria's GDP (output) performance, depending on the availability of data. Also, this study would adopt the model used by Izquierdo et al. (2008) and augment it with the variables that would be selected to model the impact of the shocks. Furthermore, the study will look at the impact of domestic economic policies (monetary and fiscal policies) in the face of these shocks. To capture the

impact of domestic policies, total government expenditure is used to capture fiscal policy, while money supply (M2) is used to capture the impact of monetary policy.

These studies and most of the other studies that investigated the role of external shocks on the economy or major macroeconomic variables used either the vector autoregressive model (VAR) or the vector error correction model (VECM). It is worthy to note that the VECM is a variant of the VAR model in first difference, and it incorporates the cointegration vector or vectors (vectors, if one gets up to $n-1$ cointegration vectors). The Johansen's technique, which is used in most of these studies, would also be used in this research to determine the number of cointegration relationships (Dolado and Lütkepohl, 1996; Clarke and Mirza, 2006). The existence of a cointegration relationship shows that there is a long run relationship amongst the variables. The VECM makes it possible to apply a VAR to integrated multivariate time series. Also, the associated impulse response function and the variance decomposition from both the VAR and the VECM have proven to be useful tools for macroeconomic policy analysis, and they have been the subject of many studies since Sims (1980).

The process of modelling the VAR or VECM is such that we first test the variables to determine if they are stationary $I(0)$ or if they have a unit root and be $I(d)$, ($d=1,2, \dots$). This is the process of determining the order of integration of the series. However, in most cases, an $I(1)$ series is differenced once to be $I(0)$, thus, in general, we say that a series is $I(d)$ if its d 'th difference is stationary. After determining the order of integration of the series, we select the appropriate lag length for the $VAR(p)$ process behind the model. A critical element in the specification of VAR models is the determination of the lag length of the VAR. This lag length is most often selected using an explicit statistical criterion such as the Akaike information criterion (AIC) or Schwarz information criterion (SIC). If most of the variables in the set are $I(1)$, it means that there may be one or more equilibrium relationships. Hence, we test for the existence and number of cointegrating relationships (vectors) using the Johansen's technique. If the test shows that the

variables have one or more cointegrating vectors, then we proceed to use a VECM which is a more suitable estimation technique. This is because it adjusts to both the short-run dynamics of the variables and deviations from equilibrium (Toda and Phillips, 1994; Toda and Yamamoto, 1995; Zapata and Rambaldi, 1997).

From the preceding, a p-th order vector autoregressive model or a VAR(p) can be written as:

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \dots + \beta_p y_{t-p} + u_t \quad (3)$$

$$y_t = \alpha + \sum_{i=1}^p \beta_i y_{t-i} + u_t \quad (4)$$

Where y_t is a vector of n variables and each of the variables is modelled as a function of p lags of the respective variables, that is, y_t is $(n \times 1)$ vector of time series variables. β_i are a set of $(n \times n)$ coefficient matrices, and u_t is an $(n \times 1)$ unobservable white noise vector process with a zero mean, it is a time-invariant covariance matrix that is serially uncorrelated or independent. In the event where the variables in y_t are not stationary, but their first differences are, it might be the case that cointegration exists between the variables, then the next best option becomes the VECM. Equation (3) is the expanded form, while equation (4) is the reduced form of the VAR model.

From the review of past studies, the VAR methodology seems to have been widely adopted by studies in assessing the impact of a shock on macroeconomic variables, as it allows us to measure or assess the magnitude of the fluctuations in economic variables which are driven by the shock variable. The apriori distinction between exogenous and endogenous variables is not a prerequisite in the VAR because this distinction has been adjudged to be subjective, hence, they are treated similarly (Sims, 1980). The VAR is estimated by looking at the combined effect of the volatility of the movements and the shocks on a given variable at a given horizon. Also, the problem of misspecification is avoided in this methodology since the technique sets no restrictions with respect to the structural relationships.

In many studies today, the interest in studying the time-varying coefficient VAR models have greatly increased (Sims and Zha, 2002; Cogley and Sargent, 2005).

The VAR analysis is most suitable for the evaluation of the functioning of large-scale macroeconomic models. According to Maddala (1992) in the analysis of the interrelationship between macroeconomic time series variables, the VAR model seems to be a strong critical starting point. Also, Darnell and Evans (1990) noted that in producing forecasts that are not influenced by how the variables in the model impact others, the VAR model offers a simpler and direct method. Furthermore, as noted in the works of Sims (1980), Kerry (2000), and Asteriou and Hall (2007) the VAR best captures the dynamic relationship amongst variables of interest because it is a linear model. The VAR methodology is categorised into two parts: the impulse response function (IRF) and the variance decomposition function (VDC). The IRF involves each variable in the model being expressed as a function of its lag, the lagged values of the other variables and an error term. The analysis of the IRF allows for the dynamic effects of shocks from one variable to all the other variables in the model to be examined (Ayadi et al., 2000). On the other hand, the VDC is a complementary approach to the IRF analysis. In the VDC, the variance of forecast errors in a given variable is assigned to self-shock, and the same is done to the other variables in the VAR (Brown and Yücel, 1999).

Over the years, the VAR model has become quite a popular tool in the literature on external shocks and macroeconomic fluctuations in both developed and developing countries. For example, this approach has been applied to Canada, Australia, Brazil and Korea, New Zealand, Chile, and Mexico by Cushman and Zha (1997); Dungey and Pagan (2000); Hoffmaister and Roldos (2001); Buckle et al. (2002); Franken et al. (2005); and Sosa (2008), respectively. Also in low-income and Latin American economies by Raddatz (2007) and Osterholm and Zettelmeyer (2008), respectively.

From the preceding, the impulse response function and variance decomposition analysis derived from the VAR are relevant and suitable for the analysis of the impact of external shocks on Nigeria's GDP performance in this study. The variance decomposition analysis is used to quantify the relative contribution of each of the external factors to the variance in the real GDP. On the other hand, the impulse response function analysis will show the reaction of domestic output to each of these external shocks. The impulse response function is a more practical approach to assessing how output performance in Nigeria has tended to react to the various shock parameters. Also, Sims (1980) suggested that the impulse response from the VAR is very suitable for policy analysis.

The VAR models have become a veritable technique in the hands of researchers as a common tool in empirical macroeconomics. It is used both in forecasting macroeconomic conditions and for evaluating the dynamic impact of shock variables. The VAR methodology suffers from some drawbacks, despite its advantages. One of the problems of the VAR model is the heavy parameterisation, which in longer time horizons, can cause poor forecasting performance. This is because the estimated parameters of the model are the basis for the level at which the forecast converges (Österholm and Zettelmeyer, 2008). Another limitation of the VAR model is that one may get misleading results, if one uses the standard methods of statistical inference. Also, standard VARs have been adjudged to miss nonlinearities, drifts/breaks in parameters and conditional heteroskedasticity without modifications (Stock and Watson, 2001). Furthermore, VARs can be unstable when it has only two or three variables, thus making it a poor predictor of the future (Stock and Watson, 1996).

4.3.1 Variables Description

The variables used for the study and their measurements are discussed in this section and summarised in Table 4.1 below:

- (i) **Real Gross Domestic Product (RGDP):** This is used to measure Nigeria's output performance as it accounts for changes in the price level (inflation-adjusted measure) and it provides a more accurate measure of economic growth. It is a macroeconomic variable that reflects the value of all goods and services produced by all the economic sectors in each year. Izquierdo et al. (2008), Aarle and Sosoian (2010), as well as Sosa and Cashin (2013) all used this variable in their work. It is worthy to note that the real gross domestic product is made up of the real non-oil gross domestic product (RGDP_N) and the real oil gross domestic product (RGDP_O). This reflects the broad categorisation of the Nigerian economy into oil and Non-oil sector. However, this research will only focus on the total real gross domestic product and the real non-oil gross domestic product. The gross domestic product is measured in real terms at 2010 constant basic prices in Naira, and it is sourced from the Central Bank of Nigeria Statistical Bulletin. This variable would be transformed into its logarithm form to allow it to conform with the other data series during estimation.
- (ii) **Real Non-Oil Gross Domestic Product (RGDP_N):** This is defined as the total gross domestic product excluding output from the oil sector. It is the GDP that is generated/produced from all the other economic sectors or activities excluding the oil sector or oil-related activities. It is also measured in real terms at 2010 constant basic prices in Naira, and it is sourced from the Central Bank of Nigeria Statistical Bulletin. Furthermore, the logarithm form of this variable would be used in the estimation process to allow it to conform with the other data series.
- (iii) **International Crude Oil Price (OP):** Considering the importance of crude oil in the country's economic fortune and the fact that international crude oil price is volatile and unpredictable, this makes international crude oil price an important variable in this research. The bulk of the Nigerian government's revenue is from the sale of crude oil. Hence, an increase in international crude oil price is apriori expected to increase

government revenue, which is expected to boost the amount of money available for the government to spend for its budget and developmental purposes (increase in government expenditure). Ultimately, it is expected that overall output measured by the gross domestic product would increase in the long-run (Calvo et al., 2006; Calvo et al., 2008; Milesi-Ferretti and Tille, 2011; Rose and Spiegel, 2011; Claessens and Kose, 2013). International crude oil price is the cost of a barrel of crude oil measured in terms of US dollar. It is sourced from the Central Bank of Nigeria Statistical Bulletin. This variable would also be transformed into its logarithm form to allow it to conform with the other data series during estimation.

- (iv) **Terms of Trade (TOT):** The inclusion of this variable in the model is borne from the knowledge that most developing and emerging economies were affected by the recent global financial crisis through trade links. Trade has been seen as central in explaining economic fluctuations in many developing countries and terms of trade volatility affect countries income volatility through trade openness. According to the World Bank World Development Index Report, this variable is measured as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000 (Rodrik, 2001; Ahmed, 2003; Broda, 2004; Calderon et al., 2005; Raddatz, 2007). The terms of trade represent the ratio between a country's export prices and its import prices. It is sourced from the Central Bank of Nigeria Statistical Bulletin. The data has already been processed as an index and would not undergo any form of transformation.
- (v) **Capital Inflows (CI):** Capital inflows are associated with sudden stops, that is, a sharp reversal in aggregate capital flows to a country, accompanied by a sharp rise in its credit spreads (Claessens and Kose, 2013). Large and persistent capital inflows have the tendency to create a boom and burst pattern in an economy, leading to the possibility of rapid

exchange rate appreciation, inflation and loss of monetary policy independence (Okpanachi, 2012). This was the case for many developing countries during the global financial crisis. The use of capital inflow in the modelling of external shocks is very important because a sudden stop of capital inflow to a country typically points to disruptions in the supply of external financing. Calvo et al. (2006 and 2008) also note that systemic sudden stops in capital inflow have severe consequences for developing and emerging economies. According to Nwokoma (2013), capital inflows affect economic variables such as domestic monetary conditions, savings and investments, foreign reserves, exchange rates and interest rates. He further stated that the effects of capital inflows could lead to real exchange rate appreciation; stock market and real estate boom; reserves accumulation; monetary expansion and effects on production and consumption. Capital inflow is measured in dollar terms (monetary terms) and it is sourced from the Central Bank of Nigeria Statistical Bulletin. This variable would also be transformed into its logarithm form to allow it to conform with the other data series during estimation.

- (vi) **U.S. 10-year Treasury Bond Rate (USTB):** Nigeria seeks investment opportunities abroad by investing in the U.S. financial market and government securities. This variable has been suggested as a channel through which the crisis was transmitted to most economies. The relationship between this variable and the dependent variable stems from the relationship between interest rate, investment, and output. It is expected that as the interest rate on this instrument rises, government investment in the instrument would increase, this would ultimately increase government earnings and in the long-run lead to an increase in output (Díaz-Alejandro, 1983; Díaz-Alejandro et al., 1984; Calvo et al., 1993; Izquierdo et al., 2008). The 10-year Treasury bond is a debt obligation issued by the United States government with a maturity of 10 years upon initial issuance. This data is sourced from the International

Monetary Fund - International Financial Statistics (IMF-IFS). The data has already been processed as a rate and would not undergo any form of transformation.

(vii) Government Expenditure (GEXP): Total government expenditure, which is made up of capital and recurrent expenditure, is one of the primary tools of fiscal policy in Nigeria. Fiscal policy is an important instrument through which the government influences the economy (especially aggregate demand). The relationship between government expenditure and economic growth has continued to generate a series of controversies amongst scholars. The nature of the impact is inconclusive. While some authors believe that the impact of public expenditure on economic growth is negative or non-significant (Vu Le and Suruga, 2005; Taban, 2010), others believe that the impact is positive and significant (Belgrave and Craigwell, 1995; Alexiou, 2009). In the case of Nigeria, several literature have deemed government expenditure to be growth enhancing (Olukayode, 2009; Torruam et al., 2014). This is in tandem with the Keynesian macroeconomic theory, which generally assumes that increased government expenditure tends to lead to high aggregate demand and in turn, rapid economic growth. Thus, capturing the impact of fiscal policy is important because it is a veritable tool in economic management and in promoting such macroeconomic objectives as price stability, economic growth, and balance of payments equilibrium (CBN, 2013). It is on this premise that this variable is used to capture the effect of domestic fiscal policy on output performance in Nigeria in the face of the other shock variables (Aarle and Sosoian, 2010; Sosa and Cashin, 2013). Total government expenditure is measure in Naira, and it is sourced from the Central Bank of Nigeria Statistical Bulletin. This variable would be transformed into its logarithm form to allow it to conform with the other data series during estimation.

- (viii) **Money Supply (M2):** M2 is a measure of money supply and is used for monetary policy purposes of price and exchange rate stability. The broad money (M2) is defined to include narrow money plus savings and time deposits, as well as foreign denominated deposits (CBN, 2006). The CBN targets money supply growth as a means of targeting inflation because inflation is viewed as being a monetary phenomenon. Hence, the CBN adopts a monetary targeting policy framework to achieve its objective of price stability (Musa et al., 2014). This variable is used to capture the effect of domestic monetary policy on output performance (Aarle and Sosoian, 2010; Sosa and Cashin, 2013). The money supply variable is measure in Naira, and it is sourced from the Central Bank of Nigeria Statistical Bulletin. This variable would be transformed into its logarithm form to allow it to conform with the other data series during estimation.
- (ix) **Global Financial Crisis (GFC):** This variable is introduced into the model in binary form (1,0). Where 1 represents the periods for which the crisis lasted and 0 for the period where there was no crisis. It is a dummy variable that is used to assess the behaviour of output when there was a crisis and when there was no crisis (with reference to the 2007/2008 global financial crisis). We expect a negative relationship between the global financial crisis and output. Also, we expect a negative effect from the crisis because of the effect of the crash in international crude oil price which affected government revenue, crude oil exports and other macroeconomic variables.

Table 4.1: Variable Description

Variable Name	Measurement	Source
Real Gross Domestic Product	The value of all goods and services produced by all the economic sectors in each year	Central Bank of Nigeria
Real Non-oil Gross Domestic Product	Gross domestic product less oil gross domestic product (That is, GDP produced by all the other sectors excluding oil related activities from the oil sector)	Central Bank of Nigeria
International Crude Oil Price	US\$/Barrel	Central Bank of Nigeria
Terms of Trade	the ratio between export prices and import prices	Central Bank of Nigeria
Capital Inflows	Total Foreign inflows into the economy	Central Bank of Nigeria
U.S. 10-Year Treasury Bond Rate	Interest rate on fixed-income investments issued by the U.S. Treasury Department	International Financial Statistics
Government Expenditure	Total Federal Government expenditure including capital, recurrent and transfers	Central Bank of Nigeria
Money Supply	Defined to include narrow money plus savings and time deposits, as well as foreign denominated deposits	Central Bank of Nigeria
Global Financial Crisis	Period for which the crisis persisted	Author

4.3.2 Correlation Coefficients

The correlation matrix is presented in Table 4.2. The table shows the correlation coefficients of the variables and the direction of the relationship that exists between them. It also shows the magnitude of the association between the dependent variables (LRGDP and LRGDP_N) and the shock variables (LOP, USTB, TOT, LCI, LGEXP, LM2). The closer the correlation coefficient (R) is to -1 or +1, the better the association (Gujarati, 2004). Since the focus of this study is on the impact of external shocks on Nigeria's output performance, attention is given to only the correlation coefficients of the output variables and the corresponding shock variables. It is worthy to note that, though the correlation table may present the direction and strength of the relationship between the dependent and independent variables, this does not necessarily mean that one causes the other (causation) (Gujarati, 2004).

On the whole, all the variables of interest are significant at the 1.0% level based on the results of the correlation coefficients. The strength of the relationship in most of the cases is quite strong, with only two weak cases. The result of the correlation

matrix also gives an indication that the model to be estimated with this data will likely not suffer from the problem of multicollinearity. The correlation coefficients matrix suggests that all the shock variables are significantly associated with the total real gross domestic product (LRGDP) at 1.0% significant level. Apriori, the coefficients in this relationship all have the expected sign, except for USTB with a correlation coefficient of -0.88, which suggest that investing in USTB will not improve output performance. Though it is significant, its sign is contrary to expectation. The result is the same for the association between the individual shock variables and non-oil real gross domestic product. This is because the real non-oil GDP contributes more to the total GDP in Nigeria (accounting for over 80.0% of total GDP, since after the 2014 GDP rebasing).

Table 4.2: Correlation Coefficients

	LRGDP	LRGDP_N	LOP	TOT	USTB	LCI	LGEXP	LM2
LRGDP	1	-						
LRGDP_N	-	1						
LOP	0.84*	0.85*	1					
TOT	0.62*	0.64*	0.94*	1				
USTB	-0.88*	-0.87*	-0.54*	-0.24	1			
LCI	0.91*	0.90*	0.63*	0.37**	-0.94*	1		
LGEXP	0.93*	0.92*	0.66*	0.39**	-0.95*	0.98*	1	
LM2	0.97*	0.96*	0.74*	0.50*	-0.93*	0.97*	0.99*	1

*, ** and ***, indicates level of significance at 1%, 5% and 10%, respectively.

4.3.3 Unit Root Test

Using non-stationary series in modelling or macroeconomic analysis has the tendency of resulting in a spurious regression, thus, making the parameter estimates to be biased or the deduction of a not true relationship between the variables (Granger and Newbold, 1974). However, most macroeconomic variables are non-stationary in nature, because they may follow certain economic patterns or cycles, even when there is no real relationship between them (Nelson and Plosser, 1982).

Consequently, to determine the order of integration of the time series used in this study, the study utilises the unit root test. Four unit root tests are applied in the investigation of the order of integration; these are the Augmented Dickey-Fuller (ADF), the Detrended Dickey-Fuller (DF-GLS), the Phillip-Peron (PP) and the KPSS test developed by Kwiatkowski et al. (1992). According to Luintel and Khan (1999) and Liang and Jian-Zhou (2006), the ADF and PP tests have been known to have lower power in the rejection of the null of a unit root. On the other hand, the DF-GLS and KPSS have been used to complement the ADF and PP tests, as they have been found to have more powers over the conventional unit root test. Liang and Jian-Zhou (2006) posit that the KPSS test in most cases has greater power than other unit root tests.

The series to be investigated are: Real Gross Domestic Product (RGDP), Real Non-oil Gross Domestic Product (LRGDP_N), International Crude Oil Price (LOP), Terms of Trade (TOT), Capital Inflows (LCI), U.S. 10-Year Treasury Bond Rate (USTB), Government Expenditure (LGEXP) and Money Supply (LM2).

Table 4.3a: Unit Root Test: Levels (Constant)

Variables	ADF	PP	DF-GLS	KPSS
LRGDP	0.72	1.8	0.09	0.67*
LRGDP_N	2.76	2.13	-0.41	0.66*
LOP	-1.04	-1.05	-1.08	0.47*
TOT	-1.68	-1.74	-1.42	0.36*
LCI	-1.61	-1.93	-0.13	0.68*
USTB	-2.27	-2.9	-0.38	0.69*
LGEXP	-2.21	-1.08	-2.08	0.67*
LM2	-0.23	-0.25	-0.45	0.69*

* and ** imply 1% and 5% levels of significance, respectively.

Table 4.3b: Unit Root Test: Levels (Constant and Trend)

Variables	ADF	PP	DF-GLS	KPSS
LRGDP	-2.22	-2.31	-1.56	0.20*
LRGDP_N	-1.93	-1.87	-1.09	0.20*
LOP	-2.24	-2.24	-1.85	0.18*
TOT	-2.49	-2.46	-1.87	0.19*
LCI	-2.3	-2.35	-2.36**	0.16*
USTB	-3.69**	-3.84**	-2.85*	0.18*
LGEXP	0.17	-0.82	-2.27**	0.18*
LM2	-2.15	-2.20	-2.10**	0.09 *

* and ** imply 1% and 5% levels of significance, respectively.

Table 4.3c: Unit Root Test: First Difference

Variables	ADF	PP	DF-GLS	KPSS
LRGDP	-3.38**	-3.22**	-2.79*	0.47*
LRGDP_N	-3.00**	-3.62**	-2.73**	0.49*
LOP	-5.16*	-5.16*	-4.92*	0.18*
TOT	-4.95*	-4.95*	-4.01*	0.23*
LCI	-6.48*	-6.50*	-4.51*	0.30*
USTB	-6.46*	-6.98*	-6.17*	0.38*
LGEXP	-1.38	-6.91*	-1.12	0.25*
LM2	-3.63**	-3.60**	-3.37*	0.13*

* and ** imply 1% and 5% levels of significance, respectively.

The results presented in Table 4.3c above indicate that all the series are stationary after first difference, that is, they are integrated of order one - $I(1)$. This means that all the series are non-stationary at levels, but stationary at first difference. As earlier stated in the works of Luintel and Khan (1999) and Liang and Jian-Zhou (2006), the greater power of the DF-GLS and KPSS of not rejecting the null hypothesis is displayed in Tables 4.3a and b. The KPSS test reports all the variables as being stationary at levels in Tables 4.3a and b, while the DF-GLS reports LCI, USTB, LGEXP and LM2 as stationary at levels in Table 4.3b.

4.3.4 The Model

The study employs a vector autoregression (VAR) framework which is made up of eight variables each: [Real Gross Domestic Product (RGDP) and Real Non-oil Gross Domestic Product (RGDP_N)] representing the output variables, while, International Crude Oil Price (OP), Terms of Trade (TOT), Capital Inflows (CI), U.S. 10-Year Treasury Bond Rate (USTB), Government Expenditure (GEXP), Money Supply (M2) and Global Financial Crisis (GFC) represent the shock variables. It is worthy to note that the global financial crisis variable would be treated as an exogenous variable in the model. This is because, in the VAR framework, a dummy variable is modelled as an exogenous variable. For this study, the VAR is adopted because the short-run dynamics and long-run causality are quite easy to distinguish once there is cointegration amongst the variables (Ang and McKibbin, 2007). Similarly, with this framework, the problem of endogeneity is eliminated as all the variables are treated as potentially endogenous (Sims, 1980).

The basic aim of our empirical estimation is to ascertain the impact of external factors (shocks) on Nigeria's output (GDP) performance and examine the long-run relationship between the variables of interest (RGDP, RGDP_N) and the shock variables OP, TOT, CI, USTB, GEXP, M2 and GFC. In the process, the research uses the generalised impulse response function (GIRF) and variance decomposition function (VDC) analytical tools of the VAR to examine the dynamic response of output to each of the shock variables, as well as determine which of these shock variables have the greater effect on Nigeria's output in the VAR framework.

Since a VAR of the p-th order, that is, a VAR (p) model have been expressed in equation (3), hence, the VAR can be expressed in a VECM form if the variables are I(1) order of integration:

$$\Delta y_t = \theta_0 + \theta_1 \Delta y_{t-1} + \theta_2 \Delta y_{t-2} + \dots + \theta_{p-1} \Delta y_{t-p+1} + \alpha y_{t-p} + u_t \quad (5)$$

Where θ_0 is a (4x1) vector of intercept with elements θ_{j0} and θ_i is an ($n \times n$) coefficient matrices with elements $\theta_{jk}(i)$, while u_t is an n-dimensional vector that has a zero mean and constant variance, and is also independently and identically distributed. Hence, if the rank of θ is of rank $1 < r < 4$, then it can be separated into $\theta = \alpha\beta'$ such that β represents the matrix of cointegrating vectors, while the matrix of adjustment is denoted by α .

$$\Delta y_t = \theta_0 + \theta_1 \Delta y_{t-1} + \theta_2 \Delta y_{t-2} + \dots + \theta_{p-1} \Delta y_{t-p+1} + \alpha(\beta' y_{t-p}) + u_t \quad (6)$$

The linear combination process is denoted by the term $\alpha\beta' y_{t-p}$. To model, the adjustment of the deviation from its long-run equilibrium, an error correction term (ECT) is incorporated into the short-run analysis of the model. This is premised on the fact that the set of variables are $I(1)$ and are cointegrated (Engle and Granger, 1987). The vector error correction model (VECM) allows for the short-run dynamics and the long-run equilibrium adjustments process to be estimated because it possesses both differenced and long-run equilibrium properties in the model.

4.3.4.1 The VAR Model

This study uses a reduced form VAR to evaluate the impact of external shocks on Nigeria's output performance. According to Stock and Watson (2001), in a reduced VAR, each variable is express as a linear function of its historical values, as well as the historical values of the other variables. This allows for previous information on the variables to be taken into account, while all other variables that account for variations in the target variables are captured in the error term. Consequently, the shocks and the unexpected behaviours in the past values of all the variables are also explained by the error term. The study will utilise two VAR models A and B, where model A represents the model with total real GDP (RGDP) and model B represents the model with the real non-oil GDP (RGDP_N) as the dependent variables. All the shock variables will remain the same for both models. The VAR is expressed thus given the selected variables and the fact that the study focuses on the output equation:

$$Y_{AB(t)} = \alpha_1 + \beta_1 LRGDP_{t-1} + \gamma_1 LOP_{t-1} + \lambda_1 TOT_{t-1} + \delta_1 LCI_{t-1} + \theta_1 USTB_{t-1} + \sigma_1 LGEXP_{t-1} + \psi_1 LM2_{t-1} + \Omega_1 GFC_{t-1} + u_{1t} \quad (7)$$

4.3.4.2 The VEC Model

Having derived the VAR specification in equation (7), the VECM specification is derived from equations (5) and (6) by writing equation (7) in its first difference form. Consequently, having established the presence of cointegration amongst the variables, the VEC model is estimated using the differenced data after achieving stationarity, and the error correction term which captures the long-run information lost through the differencing is reintroduced (Engle-Granger, 1987). The error correction term (ECT) is a measure of the extent to which the endogenous variables have temporarily departed from the long-run relationship. In this study, the VECM is expressed thus given the selected variables:

$$\begin{aligned} \Delta Y_{AB(t)} = & \varphi_1 + \alpha_{11} ECT_{t-1} + \sum_{i=1}^{p-1} \beta_{11i} \Delta LRGDP_{t-1} + \sum_{i=1}^{p-1} \beta_{12i} \Delta LOP_{t-1} + \sum_{i=1}^{p-1} \beta_{13i} \Delta TOT_{t-1} + \\ & \sum_{i=1}^{p-1} \beta_{14i} \Delta LCI_{t-1} + \sum_{i=1}^{p-1} \beta_{15i} \Delta USTB_{t-1} + \sum_{i=1}^{p-1} \beta_{16i} \Delta LGEXP_{t-1} + \sum_{i=1}^{p-1} \beta_{17i} \Delta LM2_{t-1} + \\ & \sum_{i=1}^{p-1} \beta_{18i} \Delta GFC_{t-1} + u_{1t} \end{aligned} \quad (8)$$

4.3.5 Lag Length Selection

Before beginning the process of estimation of the models that have been specified, a lag-length test is carried out to find the best possible lag-length for each of the models. Gujarati (2004) notes that choosing the appropriate lag-length can be challenging in a VAR model. This is so because, if the lag length is too small, we can have misspecification error and if the lag length is too large, the degrees of freedom are reduced (Enders, 1995). Also, Lütkepohl and Krätzig (2004) posit that a VAR model with n equations and having a lag length of p will include np coefficients. The implication of this is that a VAR model with five variables and six lags will ultimately consist of 30 parameters in every equation. Hence, the larger the amount of variables and lags included in the model, the more degrees of freedom is reduced.

The optimal lag length in a VAR model is the optimal number of lags (previous values of the independent and dependent variable) included in the model to explain the dependent variable. There are different criteria used to determine the optimal lag length. These are the Sequential Modified LR (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and the Hannan-Quinn Information Criterion (HQ), which are all automatically generated using the E-views 9 statistical package. However, Gujarati (2004) notes that the AIC and the SIC are the most widely used criteria because they specify that the model with the lowest information criteria statistic should be used. Hence, the model with the smallest information criterion statistic is predicted as the best-specified model to be used (Lutkepohl, 1991).

Both models (Models A and B) specified above, would be tested using the LR, FPE, AIC, SIC and HQ criterion and a suitable lag-length chosen. From Table 4.4, a lag length of one was selected for each of the models based on the AIC and SIC. Also, to further confirm the suitability of the selected lag length, a VAR stability condition check is conducted on each of the VAR (1,1) models. The inverse roots of the AR characteristic polynomial graphs and tables showed that no root was outside the unit circle for each of the model (see Appendix B).

Table 4.4: Lag-length Selection for the Models

Models	LR	FPE	AIC	SIC	HQ
Model A	1	2	1	1	1
Model B	1	1	1	1	1

Each test was at 5% level

Furthermore, setting the appropriate lag length is premised on the grounds that the residuals follow the assumption $\mu_t \sim NI(0, \Omega)$, that is, it follows a white-noise process. Thus, the need to carry out some diagnostic test to examine the model for residual autocorrelation, normality and heteroscedasticity.

4.3.6 Cointegration

Cointegration implies the existence of a long-run equilibrium relationship amongst the variables in the model. The concept is based on the linear combination of non-stationary variables moving closely together over time. It also gives an insight into the length of time for the system to adjust back towards equilibrium in the face of departures from this relationship (Fanchon and Wendel, 1992). When there exists a cointegrating relationship amongst the variables, this tends to eliminate the estimation problems typically associated with non-stationary data.

Estimating a multivariate VAR model using non-stationary data has been criticised over the years and so has the issue of differencing of the variables to achieve stationarity. Both approaches have been argued to introduce distortions into multivariate models. Nevertheless, Fanchon and Wendel (1992) note that there are three methodologies for estimating a multivariate VAR model using non-stationary series. One is to estimate a vector error correction model (VECM) which differences the data to achieve stationarity, while the long-run information which was lost through the differencing is restored through the introduction of an error correction term. The second is to estimate the VAR model using the raw data in levels if there exists at least one cointegrating relationship amongst the variables. This line of argument has been supported by the asymptotic distribution theory developed by Phillips and Durlauf (1986), Stock (1987), West (1988), and Sims et al. (1990). The theory posits that estimating models using such data will yield consistent parameter estimates. The third approach is to carry out a Bayesian analysis, since non-stationarity does not affect Bayesian parameter estimates.

It is on the basis of the second approach that the estimation of the VAR models in this study utilises the raw data in levels and will compare the outcome of this approach with the first approach (estimation of a VECM). The second approach has also been used in the study of “the effects of monetary policy on the real economy of Nigeria: a disaggregated analysis” (CBN, 2014b). Naka and Tufte (1997) also support the line of thought in the second approach when they stated

that a cointegrating vector is automatically fitted in a VAR estimated in levels if one exists. Engle and Granger (1987) in their Representation Theorem establishes that a VAR in levels with cointegrated variables can be written as a VECM. Since the main point of interest is in the dynamic interrelationships among the macroeconomic variables, then, estimating the VAR in levels does not allow for the loss of vital economic information in the variables. Furthermore, cointegration amongst the variables is implicitly implied when the VAR is estimated in level form, and it also explains the reluctance to impose incorrect restrictions on the model (Berkelmans, 2005).

4.3.6.1 Johansen Cointegration Test

The Johansen (1988) and Johansen and Juselius (1992) maximum likelihood framework is used in carrying out the cointegration test on the specified VAR models. This is done to establish the existence of a long-run relationship among the variables of interest. The rank (r) of the VAR matrix is used to define the number of cointegrating equations (or vectors) in the VAR system. The results of the test for the models are presented in Table 4.5, and all the results indicate that there exists at least one cointegrating equation in the models. This is confirmed by both the Trace and Maximum Eigenvalue statistics. In both instances, we reject the null hypothesis of $r \leq 0$ against the alternative of $r \geq 1$ at 0.05 level of significance. The results suggest that there exist at most one cointegrating vector in the two models.

Table 4.5: Johansen Cointegration Rank Test**Model A: VAR = (LRGDP, LOP, TOT, LCI, USTB, LGEXP, LM2, GFC) = lag (1)**

Null	Alternative	λ Trace	95% Critical value	λ max	95% Critical value
$r = 0$	$r \geq 1$	187.84*	125.62	54.24*	46.23
$r \leq 1$	$r \geq 2$	133.60*	95.75	47.14*	40.08
$r \leq 2$	$r \geq 3$	86.46*	69.82	31.97	33.88
$r \leq 3$	$r \geq 4$	54.48**	47.86	29.71**	27.58
$r \leq 4$	$r \geq 5$	24.77	29.80	16.95	21.13

Model B: VAR = (LRGDP_N, LOP, TOT, LCI, USTB, LGEXP, LM2, GFC) = lag (1)

Null	Alternative	λ Trace	95% Critical value	λ max	95% Critical value
$r = 0$	$r \geq 1$	185.63*	125.62	58.58*	46.23
$r \leq 1$	$r \geq 2$	127.05*	95.75	49.09*	40.08
$r \leq 2$	$r \geq 3$	77.95*	69.82	32.52	33.88
$r \leq 3$	$r \geq 4$	45.43	47.86	20.60	27.58
$r \leq 4$	$r \geq 5$	24.83	29.80	16.48	21.13

r indicates the number of cointegrating vector. (*) and (**) indicate statistical significance at 1% and 5% levels, respectively

For the VECM, Pesaran and Shin (2002) proposed the long-run structural modelling technique to investigate the long-run coefficient elasticities of the cointegrating vectors, applying economic theory to identify restrictions. They argue that restrictions are imposed arbitrarily in the Johansen cointegration without any consideration for economic theory. However, since there exists at most one cointegrating equation from the Johansen cointegration test, the study imposes normalisation restriction only. Also, since the main consideration of this study is on the long-run causality between Nigeria's output performance and external shocks (as defined by the shock variables); we only impose normalisation restriction on the real GDP (LRGDP and LRGDP_N). The results are presented in Table 4.6.

Table 4.6: The Long-run Coefficients of the Cointegrating Vector

Normalisation on LRGDP: Model A							ECT
LRDP =	-14.40	-0.80LOP(-1)*	+ 0.006TOT(-1)*	+ 0.01LCI(-1)	+ 0.04USTB(-1)*	+ 0.16LGEXP(-1)*	- 0.24LM2(-1)* - 0.313*
		[-7.09]	[5.24]	[0.77]	[3.14]	[3.14]	[-3.95] [-3.75]
Normalisation on LRGDP_N: Model B							ECT
LRDP_N =	-14.19	- 0.76LOP(-1)*	+ 0.01TOT(-1)*	+ 0.03LCI(-1)	+ 0.07USTB(-1)*	+ 0.15LGEXP(-1)*	- 0.24LM2(-1)* - 0.3885*
		[-5.80]	[3.41]	[1.66]	[4.52]	[2.55]	[-3.66] [-4.26]

(*) (**) (***) show level of significance at 1%, 5% and 10%, respectively and all figures in square brackets are t-statistics

The cointegrating vector of Model A shows that all the cointegrating coefficients are statistically significant at the 1.0% level, except for capital flows (LCI) which is not statistically significant at any conventional level. The error correction term (ECT) is rightly signed (negative) and statistically significant at the 1.0% level, which confirms that the variables are cointegrated in the model. The ECT basically captures the speed of adjustment of Nigeria's output to the long-run equilibrium. The adjustment speed in the cointegrating vector of model A is about 31.3%. Model B, on the other hand, uses the real non-oil gross domestic product (LRGDP_N) to assess the impact of shocks on the non-oil output performance. The result from Model B follows the same pattern as the result from Model A since non-oil GDP constitutes the greater part of the total GDP in Nigeria (accounting for over 80.0% of total GDP, since after the 2014 GDP rebasing). All the cointegrating coefficients are statistically significant at the 1.0% level, except for LCI. The error correction coefficient has the right sign (negative) and is also statistically significant (indicating long-run cointegration) and with an adjustment speed of 38.9%.

4.3.7 Causality Test

4.3.7.1 VAR Causality Test

The Granger causality test is employed to examine the causal relationship between output and the shock variables used in this study. This test enables us to test for the existence of short-run relationships amongst the variables of interest (Granger, 1969 and 1988). It is worthy to note that the Granger causality test is not just used to determine the relationship between the independent and dependent variables, but also to ascertain the direction of the causality between them. Hence, the future values of the variables can be predicted, if there is a causal relationship between

them. The test seeks to ascertain to what extent the changes in the past values of a variable Y_t accounts for the variations in the contemporaneous values of another variable X_t . Therefore, Granger causality exists between variables Y_t and X_t , if by including the past values of Y_t , X_t we can make a much better prediction with much accuracy, otherwise it is said that Y_t does not Granger-cause X_t (Gujarati, 2004).

The Granger test is based on the following equations when testing for the bilateral causality between two variables:

$$y_t = \alpha_{10} + \sum_{i=1}^T \alpha_i x_{t-i} + \sum_{j=1}^T \beta_j y_{t-j} + \varepsilon_{1t} \quad (9)$$

$$x_t = \alpha_{20} + \sum_{i=1}^T \gamma_i x_{t-i} + \sum_{j=1}^T \theta_j y_{t-j} + \varepsilon_{2t} \quad (10)$$

Where the random terms ε_{1t} and ε_{2t} are uncorrelated (Gujarati, 2004). Equation (9) shows the relation between Y_t , the past values of X_t and past values of Y_t , while equation (10) shows the relation between X_t , the past values of Y_t and past values of X_t . The chi-square test is used to examine the causality from $Y_t \rightarrow X_t$ based on a null hypothesis “ Y_t does not Granger cause X_t ” ($H_0: \sum_{j=1}^T \theta_j = 0$), tested against the alternative hypothesis “ Y_t Granger cause X_t ” ($H_A: \sum_{j=1}^T \theta_j \neq 0$). Conversely, to examine the causality from $X_t \rightarrow Y_t$ the null hypothesis “ X_t does not Granger cause Y_t ” ($H_0: \sum_{i=1}^T \alpha_i = 0$), is tested against the alternative hypothesis “ X_t Granger cause Y_t ” ($H_A: \sum_{i=1}^T \alpha_i \neq 0$).

In testing the interaction between the variables, four possible permutations of the variables are carried out thus:

- (1) Unidirectional causality from $X_t \rightarrow Y_t$; where the estimated coefficients on the lagged X ($\sum_{i=1}^T \alpha_i$) in equation (9), are statistically different from zero as a group ($\sum_{i=1}^T \alpha_i \neq 0$), while the set of estimated coefficients on the lagged Y ($\sum_{j=1}^T \theta_j$) in equation (10), is not statistically different from zero ($\sum_{j=1}^T \theta_j = 0$) (Gujarati, 2004).
- (2) Unidirectional causality from $Y_t \rightarrow X_t$ exists where the set of estimated coefficients on the lagged X ($\sum_{i=1}^T \alpha_i$) in equation (9) is not statistically

different from zero ($\sum_{i=1}^T \alpha_i = 0$), while the set of estimated coefficients on the lagged Y ($\sum_{j=1}^T \theta_j$) in equation (10), is statistically different from zero ($\sum_{j=1}^T \theta_j \neq 0$) (Gujarati, 2004).

- (3) Bi-directional causality, that is, a case where there is a feedback, the set of estimated coefficients on the lagged Y_t and X_t are statistically significantly different from zero in both equations ($\sum_{i=1}^T \alpha_i \neq 0, \sum_{j=1}^T \theta_j \neq 0$) (Gujarati, 2004).
- (4) No causality, that is independence is suggested, where the set of estimated coefficients on the lagged Y_t and X_t are not statistically different from zero in both equations ($\sum_{i=1}^T \alpha_i = 0, \sum_{j=1}^T \theta_j = 0$) (Gujarati, 2004).

The Granger causality test with a null hypothesis of no Granger causality can be carried out in a VAR. In the VAR model, the Granger causality test is based on the block exogeneity Wald test. The chi-square statistic for the joint significance of each lagged endogenous variables and all other lagged endogenous variables in the equations of the model are used in this test.

Table 4.7: VAR Granger Causality/Block Exogeneity Wald Tests

Model A								
Dependent Variable	Source of causation							
	LRGDP	LOP	TOT	LCI	USTB	LGEXP	LM2	All (6)
LRGDP	-	0.40	5.21**	4.42**	0.47	5.47**	5.52**	15.38**
LOP	1.62	-	0.71	0.39	0.05	1.19	0.47	6.44
TOT	0.33	0.0004	-	0.10	0.32	0.68	0.20	2.98
LCI	0.02	0.08	0.08	-	0.06	1.71	0.01	8.84
USTB	0.05	1.10	2.47	0.86	-	0.57	2.93***	9.13
LGEXP	0.23	0.07	1.06	0.04	0.50	-	4.49**	16.36**
LM2	0.01	3.90**	2.87***	0.02	0.30	8.84*	-	25.00*
Model B								
Dependent Variable	Source of causation							
	LRGDP_N	LOP	TOT	LCI	USTB	LGEXP	LM2	All (6)
LRGDP_N	-	0.27	2.72***	2.91***	0.68	3.01***	2.86***	12.44***
LOP	2.30	-	0.59	0.46	0.11	1.79	0.75	7.24
TOT	0.87	0.01	-	0.10	0.50	1.00	0.41	3.57
LCI	0.16	0.15	0.09	-	0.12	1.37	0.04	9.02
USTB	0.50	1.58	2.61	0.94	-	0.83	3.65***	9.74
LGEXP	0.08	0.003	1.27	0.01	0.17	-	5.58**	16.11**
LM2	0.001	4.02**	2.87***	0.02	0.27	8.27*	-	24.98*

*, ** and ***, indicates level of significance at 1%, 5% and 10%, respectively, with df in parentheses.

From the results of the VAR Granger causality test presented in Table 4.7, the study basically focuses on the direction of causation from the shock variables to the dependent variables LRDGP and LRGDP_N, and vice versa. The result of Model A shows that the null hypothesis of non-causality from terms of trade, capital flows, government expenditure and money supply to output is rejected at 5.0% significance level. This indicates that there is a unidirectional causality from these variables to output.

In contrast, we cannot reject the null hypothesis of non-causality from international crude oil prices and US Treasury bond rate to output at any conventional significance level. This might not be unconnected with the fact that the transmission of the effect of these variables to output is not direct, but through other variables. The null hypothesis of non-causality from output to all the shock variables cannot be rejected also. However, the Chi-square for the joint significance of the explanatory variables indicates that the null hypothesis of non-causality from international crude oil prices, terms of trade, capital flows, US Treasury bond rate, total Government expenditure and money supply to output is

rejected at the 5.0% significance level. Subsequently, the results from Model B follows the same trend as that of model A, and the joint significance of the explanatory variables is rejected at the 10.0% significance level for the null hypothesis of non-causality from all the explanatory variables to output.

4.3.7.2 VECM Causality Test

In the case of the VECM, Engle and Granger (1987) posits that the error correction mechanism should be incorporated into any dynamic analysis, given that the set of variables for the estimation are all $I(1)$ and cointegration exist. The error correction mechanism or error correction term measures the deviation of the system from the long-run equilibrium. Having fulfilled the above conditions, the Granger causality test would then be formulated based on the following VECM framework in equations (11) and (12):

$$\Delta Y_t = \alpha_{10} + \sum_{j=1}^p \beta_{1j} \Delta Y_{t-j} + \sum_{j=1}^p \gamma_{1j} \Delta X_{t-j} - \lambda_y ECT_{t-1} + \varepsilon_{1t} \quad (11)$$

$$\Delta X_t = \alpha_{20} + \sum_{j=1}^p \beta_{2j} \Delta Y_{t-j} + \sum_{j=1}^p \gamma_{2j} \Delta X_{t-j} - \lambda_x ECT_{t-1} + \varepsilon_{2t} \quad (12)$$

The causality in the VECM framework above is examined in two folds: through the short-term difference lagged variables (ΔY_{t-j} and ΔX_{t-j}) and the long-term error correction terms (ECT_{t-1}). The joint significance of the coefficients of the lagged difference variables (γ_{1j} and β_{1j}) is used to determine the short-run causality from $X_t \rightarrow Y_t$ and from $Y_t \rightarrow X_t$. Also, a long-run causality exists from the explanatory variables to the dependent variable, if the coefficients of the error correction terms (λ_y or λ_x) are statistically significantly different from zero ($\lambda_y \neq 0$, $\lambda_x \neq 0$). It is quite difficult in multivariate causality tests to show which explanatory variable causes the dependent variable, however, if the error correction coefficient is statistically significantly different from zero, then the causality is seen to run interactively via the error correction term.

Table 4.8: Short-run VECM Granger Causality/Block Exogeneity Wald Tests

Model A								
Dependent Variable	Source of causation							
	Δ LRGDP	Δ LOP	Δ TOT	Δ LCI	Δ USTB	Δ LGEXP	Δ LM2	All (6)
Δ LRGDP	-	5.03**	4.44**	5.49**	3.26***	3.00***	4.43**	20.70*
Δ LOP	0.01	-	0.15	0.04	0.74	1.41	0.82	2.23
Δ TOT	0.08	0.0004	-	0.49	1.46	1.63	1.34	3.68
Δ LCI	0.08	0.07	0.02	-	0.003	0.20	2.04	2.47
Δ USTB	1.04	2.23	2.32	0.23	-	1.39	0.71	4.25
Δ LGEXP	0.55	2.75***	0.99	0.10	0.35	-	0.21	4.58
Δ LM2	0.75	1.07	0.59	0.15	0.02	2.76	-	5.50
Model B								
Dependent Variable	Source of causation							
	Δ LRGDP_N	Δ LOP	Δ TOT	Δ LCI	Δ USTB	Δ LGEXP	Δ LM2	All (6)
Δ LRGDP_N	-	3.72***	1.73	0.01	6.54**	2.97***	2.50	10.49
Δ LOP	0.15	-	0.15	0.03	0.65	1.37	0.72	2.26
Δ TOT	0.01	0.02	-	0.39	1.38	1.42	0.97	3.27
Δ LCI	0.001	0.19	0.34	-	0.06	0.14	1.74	2.44
Δ USTB	0.24	1.79	1.43	0.13	-	1.00	0.29	2.72
Δ LGEXP	0.02	2.21	0.68	0.01	0.48	-	0.34	3.89
Δ LM2	0.0004	0.95	0.57	0.16	0.001	2.43	-	4.56

*, ** and ***, indicates level of significance at 1%, 5% and 10%, respectively, with df in parentheses.

The result of the short-run Granger causality for the VECM is presented in Table 4.8. Model A shows that the null hypothesis of non-causality from international crude oil price, terms of trade, capital flows and money supply to output is rejected at 5.0% significance level, indicating that there is a unidirectional causality from these variables to output. Similarly, the null hypothesis of non-causality from US Treasury bond rate and total Government expenditure to output is rejected at 10.0% significance level. Correspondingly, the Chi-square for the joint significance of the explanatory variables indicates that the null hypothesis of non-causality from Δ LOP, Δ TOT, Δ LCI, Δ USTB, Δ LGEXP and Δ LM2 to output is rejected at 1.0% significance level. However, we cannot reject the null hypothesis of non-causality from output to all the shock variables at any conventional significance level.

From the result of Model B, the null hypothesis of non-causality from international crude oil price and total Government expenditure to output is rejected at 10.0% significance level, while the null hypothesis of non-causality from US Treasury bond rate to output is rejected at 5.0% significance level. The result indicates that

there is no unidirectional causality from terms of trade, capital flows and money supply to output at any conventional significance level. Consequently, the Chi-square for the joint significance of the explanatory variables indicates that the null hypothesis of non-causality from all the shock variables to output cannot be rejected at any conventional significance level. Similarly, we cannot reject the null hypothesis of non-causality from output to all the shock variables at any conventional significance level.

Table 4.9: The Long-run Causality within the VECM framework

Model A			Model B		
Dependent Variable	ECT _{t-1}	t-statistic	Dependent Variable	ECT _{t-1}	t-statistic
ΔLRGDP	-0.31*	-3.75	ΔLRGDP_N	-0.39*	-4.26
ΔLOP	-0.87	-0.09	ΔLOP	0.07	0.09
ΔTOT	-75.78	-0.80	ΔTOT	-37.3	-0.49
ΔLCI	-3.40**	-2.13	ΔLCI	-2.76**	-2.18
ΔUSTB	-3.96	-1.39	ΔUSTB	-2.29	-0.98
ΔLGEXP	-0.74	-1.07	ΔLGEXP	-0.47	-0.83
ΔLM2	0.10	0.28	ΔLM2	0.08	0.28

*, ** and ***, indicates level of significance at 1%, 5% and 10%, respectively.

Table 4.9 presents the long-run causality results within the VECM framework. In the estimated VECMs, the study basically focuses on the output equations (LRDGP and LRGDP_N). In Model A, only the coefficients of the error correction terms for ΔLRGDP and ΔLCI are significant at the 1.0% and 5.0% levels, respectively. Since the focus of the study is the total real gross domestic product equation, the coefficient of the error correction term (-0.31) is negative and significant at the 1.0% level, indicating the existence of a long-run equilibrium relationship amongst the variables. This means that approximately 31.0% of the disequilibrium in total real GDP caused by a shock to the other variables in year $t-1$ converges to the long-run equilibrium in year t . This result can be interpreted as a long-run causality which runs interactively through the error correction term from international crude oil price, terms of trade, capital flows, US Treasury bond rate, total Government expenditure and money supply to total real GDP.

Similarly, the result of Model B follows the same pattern as that of Model A. Here, only the coefficients of the error correction terms for ΔLRGDP_N and ΔLCI are significant at the 1.0% and 5.0% levels, respectively. Particularly, the coefficient of the error correction term of the non-oil output equation (-0.39) is negative and significant at the 1.0% level, indicating that approximately 39.0% of the disequilibrium in real non-oil output caused by a shock to the other variables in year $t-1$ converges to the long-run equilibrium in year t . This result also indicates the existence of a long-run causality which runs interactively through the error correction term from international crude oil price, terms of trade, capital flows, US Treasury bond rate, total Government expenditure and money supply to real non-oil output.

4.3.8 The Generalised Impulse Response Function (GIRF)

Often, macroeconomists are concerned with the dynamic effects of shocks on variables over time when working with VAR models to understand the interrelations among the variables in the system. The understanding of these dynamic effects and the interrelations amongst the variables is made possible by the impulse response functions (IRF). The IRF is used to trace out the time path of the effect of shocks at time t on the expected future values of the variables in the VAR model (Ewing et al., 2002). Basically, two types of IRFs can be generated from the VAR: the traditional orthogonalised IRF Sims (1980) and the recent generalised impulse response function (GIRF) of Koop, et al. (1996) and Pesaran and Shin (1998).

Sims (1980) uses the Cholesky decomposition to generate the IRF in the VAR model by making sure that the shocks are uncorrelated. The Cholesky decomposition method works on the “orthogonality” assumption, that is, the results of the VAR model are sensitive to the Cholesky ordering. This becomes problematic when the variables in the VAR system are reordered, leading to vastly different results (Lütkepohl, 1991). The GIRF developed by Pesaran and Shin (1998) enables us to overcome this problem of ordering in the traditional

orthogonalised IRF. Several authors have used the GIRF: Boyd et al. (2001), Ewing et al. (2002), Panagiotidis et al. (2003), Cheung et al. (2004) and Huang et al. (2008) to mention just a few. The GIRF provides a tool to evaluate the dynamics in a time series model by mapping out the reaction in the variable of interest to a one standard deviation shock to the residual in the explanatory variable equation (Ewing et al., 2002). The GIRF is insensitive to the ordering of the variables in the VAR model. It is premised on the following assumptions:

- (1) The disturbance terms are normally distributed with a constant covariance matrix Σ ; that is, $u_t \sim N(0, \Sigma)$ (Pesaran and Shin, 1998);
- (2) All the variables are stationary, that is, $|I_m - \sum_{i=1}^p A_i z^i| = 0$ fall outside the unit circle (Pesaran and Shin, 1998); and
- (3) The regressors are not perfectly collinear, that is, $X_{t-1}, X_{t-2}, \dots, X_{t-p}, t = 1, 2, \dots, T$ (Pesaran and Shin, 1998).

The GIRF is obtained by augmenting a VAR model (transforming the VAR into infinite moving average representation) (Pesaran and Shin, 1998). Pesaran and Shin (1998) also show that the GIRF can be used for a cointegrating VAR model (VECM). They note that when the GIRF is employed on the cointegrating relations, valuable information about the speed of convergence of the system to equilibrium is contained in their time profile, as the effects of shocks die out.

$$GIRF(\beta_{jxt}N) = \frac{\beta_j' \varphi N \Sigma e_i}{\sqrt{\partial_{ii}}} \quad (13)$$

Therefore, the GIRF in equation (13) gives the effect of a unit shock to the i^{th} variable on the j^{th} cointegrating relations (see the derivation of the GIRF in appendix C).

4.3.9 The Variance Decomposition Function (VDC)

The above-generalised impulses response function can be used to derive the forecast error variance decompositions (VDC). The VDC is the proportion of the n -step ahead forecast error variance of the variable i which is accounted for by the innovations in variable j in the VAR (Pesaran and Shin, 1998). The generalised forecast error variance decomposition for $n = 0, 1, 2, \dots$, is given thus:

$$\theta_{ij}^g(n) = \frac{\partial_{ii}^{-1} \sum_{l=0}^n (e_i' \varphi_l \Sigma e_j)^2}{\sum_{l=0}^n e_i' \varphi_l \Sigma \varphi_l' e_i}, i, j = 1, \dots, m \quad (14)$$

The forecast-error of variance decomposition is complementary to the impulse response function. The VDC provides information about the relative importance of each random innovation in affecting the variables in the VAR, by enabling us to evaluate the proportion of the movement in the sequence that is attributed to own shock and shocks in other variables. It allows us to infer how much of a change in a variable is due to own shock and how much is due to shocks to other variables. In this study, the GIRF and VDC are presented in two folds: (1) the unrestricted VAR level and (2) at the VEC restriction level.

4.4 Summary

This chapter dwelled extensively on the methodology adopted in this research to evaluate the impact of external shocks on Nigeria's output performance in the face of the global financial crisis. The study adopted a multivariate vector autoregression (VAR) approach to determine the impact and contribution of each shock variables to the variation in the GDP performance. The generalised impulse response function (GIRF) and variance decomposition (VDC) analytic tools of the VAR were used to determine the percentage of innovation contributed by each of the variables to the other variables in the VAR model, as well as to trace the time path of structural shocks in the VAR model. Also, the study used the vector error correction model (VECM) framework to further evaluate the long-run behaviour of the model through the error correction term. Finally, the study will adopt the methodology and variables from the studies of Izquierdo et al. (2008), Aarle and Sosoian (2010), and Sosa and Cashin (2013).

Chapter Five

Presentation of Results and Findings

5.1 Introduction

The sections in this chapter will feature the presentation and discussion of the results from the multivariate analysis. The analysis in this chapter uses annual data sourced from two reputable databases: The Central Bank of Nigeria (CBN) and the International Financial Statistics (IFS) of the International Monetary Fund (IMF) for the period 1981-2015. Also reported in this chapter are the results of the various diagnostic tests used to evaluate the estimated models.

5.2 Models Estimation

5.2.1 VAR Estimation and Diagnostic Test

Having estimated the VAR models represented in equation (7), we then carry out some diagnostic test to check for the stability and robustness of the models (Normality, heteroscedasticity and autocorrelation tests). The results of the normality and heteroscedasticity tests for each of the models are presented in Table 5.1, while the autocorrelation test result is presented in Table 5.2. The normality test was based on the skewness, kurtosis and jarque-bera statistics, the autocorrelation LM test was used to test for serial correlation, while the white heteroscedasticity test (with no cross terms) was used to test for heteroscedasticity, all the test were carried out using the E-views 9 statistical package.

Table 5.1: Residual Test - Normality and Heteroscedasticity

Models	Skewness (χ^2)	p- Value	Kurtosis (χ^2)	p- Value	Jarque-Bera (χ^2)	p- Value	Heteroscedasticity (χ^2)	p- Value
Model A	10.59	0.16	5.25	0.63	15.84	0.32	449.14	0.16
Model B	7.93	0.34	5.51	0.60	13.44	0.49	433.49	0.31

Table 5.2: Residual Test (Autocorrelation)

Models	Lag	LM-Statistic	p-value
Model A	1	58.88	0.16
Model B	1	49.77	0.44

In Model A, the statistic for the skewness and kurtosis are compared with a χ^2 distribution with n degrees of freedom. The joint hypothesis of skewness and kurtosis, or the jarque-bera test (JB) also follows a χ^2 distribution with 2 degrees of freedom. The null hypothesis (H_0) for the normality test is that the residuals have a normal distribution, that is, skewness is zero, and excess kurtosis is zero. In this model, we fail to reject the null hypothesis of normality for the skewness, kurtosis and the JB tests, because the p-values of these test statistic were greater than 0.05. Also, we failed to reject the null hypothesis of the White heteroscedasticity test, which is homoscedasticity in the model. If we reject the null hypothesis, then we are accepting that the residuals in the model are heteroscedastic. From Table 5.2, we test for autocorrelation using the autocorrelation LM test, which the null hypothesis is that there is no serial correlation of any order up to p . The test follows an asymptotically distributed χ^2 with n^2 degrees of freedom (n = the number of variables in the model). In Model A, the χ^2 was 58.88 with a p-value of 0.16, therefore, we failed to reject the null hypothesis of no serial correlation at the 95.0% level, hence, the model has a good fit and can be estimated.

Model B followed the same trend as in Model A, where we failed to reject the null hypothesis for the normality test, autocorrelation test and the heteroscedasticity test. For the normality test, the p-values of the skewness, kurtosis and the JB tests were all greater than 0.05. We failed to reject the null for autocorrelation test for a χ^2 value of 49.77 with a p-value of 0.44. Similarly, the null hypothesis of homoscedasticity was not rejected for a χ^2 value of 433.49 with a p-value of 0.31, meaning that there was no misspecification problem.

5.2.2 VECM Estimation and Diagnostic Test

The results of the estimated vector error correction model (VECM) for the two models are presented in Table 5.3. In Models A and B, the long-run error correction term (ECT) suggests the existence of a long-run relationship amongst the variables and the system will return to equilibrium in the long-run. Some diagnostic tests are conducted on the models to check for autocorrelation, normality and homoscedasticity of the residuals. The serial correlation LM test is used to test for the presence of autocorrelation, the Jarque-Bera test statistic from the residual normality test is used to verify the normality of the residuals, while the White test is used to check for heteroscedasticity. From the results presented in Table 5.3, the White test chi-square statistic for Models A and B with the corresponding p-values in parenthesis is given as 32.61 (0.97) and 40.78 (0.79), respectively. This indicates that the null hypothesis of homoscedasticity cannot be rejected at any conventional significance level. Similarly, the null hypothesis of no autocorrelation of the residuals cannot be rejected up to the 9th lag at any conventional significance level, since all corresponding p-values are greater than 10.0%. Correspondingly, the null hypothesis of multivariate normal residuals cannot be rejected at any conventional significance level, given the Jarque-Bera test statistic of 9.76 (0.78) and 18.25 (0.20) for model's A and B, respectively. The adjusted- R^2 of model's A and B shows that about 57.0% and 46.0% of the variations in output performance is accounted for by the shock variables in the models.

Table 5.3: The Estimated Short-run VECM Result³

Variables	Model A: ΔLRGDP	Model B: ΔLRGDP_N
$\Delta \text{LRGDP}_{t-1}$	0.38*	-
$\Delta \text{LRGDP}_N_{t-1}$	-	0.26***
ΔLOP_{t-1}	-0.12**	-0.14***
ΔTOT_{t-1}	0.001**	0.0009
ΔLCI_{t-1}	-0.02**	-0.001
ΔUSTB_{t-1}	0.01***	0.02**
$\Delta \text{LGEXP}_{t-1}$	0.04***	0.06***
ΔLM2_{t-1}	-0.11**	-0.11
GCF	-0.01**	-0.002
ECM_{t-1}	-0.31*	-0.39*
C	0.06	0.07
F-Statistic	5.71*	4.03*
R^2	0.69	0.61
Adj- R^2	0.57	0.46
Serial Correlation LM test (χ^2)	32.61 (0.97)	40.78 (0.79)
Heteroscedasticity test (χ^2)	485.89 (0.37)	492.22 (0.29)
Normality test	9.76 (0.78)	18.25 (0.20)
Half-life time of the deviation from equilibrium output performance in years		
	2.2	1.8

*, ** and ***, indicates level of significance at 1%, 5% and 10%, respectively.

The P values of diagnostic tests statistic are in parenthesis.

Furthermore, the VECM stability condition check is done by calculating the inverse roots of the AR characteristic polynomial. The result shows that the VEC specification for all the models imposes 6-unit roots, while the remaining roots have modulus less than one, and none of the roots lay outside the unit circle. Consequently, since there are seven variables and at most one cointegrating equation in the system, the estimated VECM is stable.

³ It is noteworthy to highlight that in the models used in this study, in the short-run oil price tends to have a negative effect, while in the long-run the effect is positive. Thus, these results should be interpreted with caution as an appropriate discounting factor or discounting rate would be required to effectively compare both results.

In most economic literature, many of the macroeconomic relationships are formulated based on the long-run effect that a given variable or shock exerts on another variable (Fanelli and Paruolo, 2010). In a VECM, the error correction term measures the deviation of the dependent variable from its equilibrium (or long-run) value through the residual from the cointegrating regression. In this case, the coefficient of the dependent variable is chosen to be normalised to one. The error correction term or the speed of adjustment of the system captures the deviations from the long-run equilibrium that is eliminated during a single period. However, to apply a time dimension or interpret the error correction term in terms of the length of time it would take the system to revert to its equilibrium state, several studies have used the concept of half-life. The concept of half-life is used to measure the speed of adjustment, that is, the time needed to eliminate 50% of the deviation (Cheung and Lai, 2000; Mark, 2001; Kilian and Zha, 2002; Rossi, 2005; Fanelli and Paruolo, 2010). Koop et al. (1996) and Pesaran and Shin (1996, 1998) stated the concept of adjustment in multivariate terms. Both authors discussed the impulse responses for nonlinear multivariate systems (Koop et al., 1996) and the generalised impulse responses (Pesaran and Shin, 1996, 1998) as indicators of the speed of adjustment in cointegrated models (Fanelli and Paruolo, 2010). In these approaches, the speed of adjustment (speed of convergence) is only inferred.

The concept of half-life has been used in the analysis of purchasing power parity (PPP) adjustment (Engel and Morley, 2001; Cheung et al., 2004; Crowder, 2004). It was used to check whether nominal exchange rates or prices revert faster to equilibrium. In trying to arrive at a benchmark for the half-life, Fanelli and Paruolo (2010) note that the half-life should not be more than one or two years, if the source of the deviations from equilibrium is monetary in nature. They pointed out that this is about the amount of time required for sticky goods prices and wages to adjust to monetary shocks. Rogoff (1996) benchmarks the half-life for developed countries and the post-Bretton Woods between 3 to 5 years. The concept of half-life has also been applied in the evaluation of policy effectiveness. Omtzigt and

Paruolo (2005) posit that policymakers can gain valuable information from the speed at which a target variable adjusts to its long-run level, if the policy is effective. Policymakers would most likely prefer a situation where a policy intervention is accomplished more quickly over one that would take longer to impact the variable of interest (Fanelli and Paruolo, 2010). The above discussion tries to emphasise the significance of the speed of convergence to equilibrium and whether the data support a long-run equilibrium dynamic.

From Table 5.3, the half-life time in years for each of the models is given as 2.2 for Model A and 1.8 for Model B. This gives the length of time in years that Nigeria's output performance in the two models will revert to its long-run equilibrium level in the face of a standard innovation in the shock variables. Based on the above discussions, and given that the study used annual data, we can interpret the half-life time in years for Model A as a little over two years (approximately two years and two months), while that of Model B as over one and a half years (approximately one year and eight months), intuitively. The result of Models A and B reaffirms the statistical significance of the error correction term and the fact that the adjustment coefficients are valid. This means that the system can eliminate about 50% of the deviations from the cointegrating relationship and will return to its long-run equilibrium path.

The individual coefficients of the estimated VECM in Table 5.3 give the short-run coefficient estimates of the VECM. According to Lütkepohl (2006), evaluating the marginal effects of a change in the independent variables in the VECM system may not reflect the actual response of the dependent variable. This is because an isolated change in a single variable is not likely to occur if the variable is correlated with the other variables. Juselius (2006) posit that the interpretation of the response of the dependent variable could be confused if the shocks from the independent variables are correlated with each other. This is because in an interactive system such as that of the VECM the confusion could arise from not knowing which shock generated the response/effect. That is why Fisher et al.

(1995, p. 128) stated that “with the recent attention to non-stationarity and cointegration, issues of identification have focused on restrictions on the long-run effects of the structural shocks rather than on restrictions on the contemporaneous interactions among the variables”.

Be that as it may, we still go ahead to assess the statistical significance of the estimated parameters in the VECM, however, the interpretations are to be taken with caution. In Model A, all the estimated parameters are statistically significant at the 1.0%, 5.0% and 10.0% levels. In Model B, only the lagged dependent variable, lagged international crude oil price, lagged U.S. Treasury bond rate and lagged total government expenditure were statistically significant at the 5.0% and 10.0% levels. The lagged dependent variables in Models A and B ($LRGDP_{t-1}$, 0.38 and $LRGDP_N_{t-1}$, 0.26) were statistically significant at the 1.0% and 10.0% levels, respectively. This confirms the significant response of these variables to innovations in own shocks in the impulse response function and their huge share in accounting for their own variability in the variance decomposition function.

The lagged international crude oil price in Models A (-0.12) and B (-0.14) was statically significant at the 5.0% and 10.0% levels, respectively. This is also reflected in the response of output performance in the impulse response function and its significant share in accounting for the variability in output performance. The sign of the parameter shows that there exists a negative relationship between international crude oil price and real domestic output performance. This could be attributed to the fact that while Nigeria as an oil producing country would benefit positively from an increase in international crude oil price via its impact on oil revenue, the country could also be affected negatively. The negative impact could be through the increase in energy and transportation cost for industries and businesses, as well as households. The high cost of crude oil which translates into higher energy cost would increase overheads and running cost for most businesses, and this would translate into an increase in the prices of goods and services. It would also increase household's consumption expenditure on

transportation and energy, as well as their expenditure on goods and services. It is also worthy to note that the sign of the parameter estimate for this variable is that of a short-run result, which is different from that of the long-run. This difference can be attributable to the lack of refining capacity and other bottlenecks experienced within the sub-sector.

The lagged term of trade is not statistically significant in Model B at any of the conventional levels, but only statistically significant in Model A (0.001) at the 5.0% level. The rather small size of its coefficient is also reflected in its share in accounting for the variability in output performance. Thus, looking at Model A, the result shows that a positive term of trade will increase output performance, *ceteris paribus*, and this result is consistent with the findings of (Izquierdo et al., 2008; Hernández, 2013; Jääskelä and Smith, 2013). However, in Model B where the dependent variable is the real non-oil gross domestic product, the result might point to the effect of the low proportion of non-oil sector's output in Nigeria's trade. Lagged capital inflows in Model A (-0.02) is statistically significant at the 5.0% level, though the sign is not as expected. The sign of the parameter estimate is reinforced in the response of output performance in the impulse response function. According to Izquierdo et al. (2008), the result implies that capital inflows can have deteriorating effects arising from a sudden stop episode, given the large and unexpected nature of sudden stops. This reaffirms the findings from the works of Calvo (1998), Calvo et al. (2003), Calvo et al. (2004) and Calvo and Talvi (2005).

However, the lagged capital inflow in Model B was not statistically significant at any conventional level and was also negative. The nature of the result from the models might not be unconnected with the nature of the capital inflow. The nature of capital inflow into the Nigerian economy is mostly oil/natural resource-driven, as well as highly speculative in nature owing to the high portfolio investments in the financial market. The negative sign on the capital inflow can be attributed to the short-run nature of capital inflows. The volatility of short-term capital flows (or 'capital surges') has been recognized as a major problem for macroeconomic

management in many developing countries, with its attendant effect on the 'real' economy (Singh, 2009). It affects the behavior of government, firms and households which subsequently transmits to investment, growth, employment and welfare. Short-term capital flow instability arises from the desire of investors to hold liquid assets in the face of uncertainty; affecting the real economy both through variations in both prices such as the interest rate and the exchange rate, and quantities such as levels of bank credit and government bond sales. These types of inflows are rather unstable in nature. Hence, the effect of a sudden stop shock or even excess of such inflows, can be very distortionary and have deteriorating effect alluded to by Izquierdo et al. (2008).

Lagged U.S. Treasury bond was statistically significant in Models A (0.01) and B (0.02) at the 10.0% and 5.0% levels, respectively. The sign was expected, as the government's investment in this instrument is expected to yield returns, which is ultimately invested in the productive sector of the economy. Lagged government expenditure (fiscal policy) is statistically significant in Models A (0.04) and B (0.06) at the 10.0% level, and the sign is as expected. The result is consistent with the works of Cheng (2003) who found that innovations in fiscal policy (government budget deficit) significantly affect real GDP in Malaysia. Government is a major player in the Nigerian economy (largest employer of labour, huge investment in infrastructure and a huge consumer of goods and services). Government expenditure in Nigeria is broadly categorised into capital and recurrent, with the recurrent expenditure accounting for about 70.0% of total government expenditure. The recurrent expenditure takes care of salaries and wages of both public and civil servants in the country, who spend it mostly on consumption which feeds into the GDP. Government expenditure stimulates aggregate demand and impacts almost immediately on output performance, even though output performance will respond with a lag.

The lagged monetary policy variable (money supply) was only statistically significant in Model A (-0.11) at the 5.0% level, though the sign was not as

expected and is not consistent with the results of the impulse response function. However, Christiano et al. (1999) in their study found that monetary policy shock had a significant impact on the volatility of aggregate output, as it accounted for 22.4%, 43.1% and 35.0% of the variability in aggregate output in the 4th, 8th and 12th quarter, respectively. Similarly, Apere and Karimo (2015), Edoumiekumo et al. (2013) and Chuku (2009) also found similar results evaluating the impact of monetary policy shocks on agricultural output growth; real sector output; as well as output and prices in Nigeria, respectively. The plausible explanation for the result in Model A could be the fact that monetary policy in Nigeria over the years have been very accommodative. The high degree of fiscal indiscipline on the part of the government has been very detrimental to the efficacy of monetary policy and has been very distortionary. The monetary authority has often struggled to mop up the excess liquidity injected into the economy by the fiscal arm through government's monetisation of funds from the excess crude account. There is no harmonisation of policy between the fiscal and monetary authorities. The variable was not statistically significant in Model B at any conventional levels.

The global financial crisis variable (GFC) was only statistically significant in Model A (-0.01) at the 5.0% level, but not in Model B at any conventional levels, though the sign is as expected. The sign of the GFC in Model A shows that there exists a negative relationship between the global financial crisis and output performance (Ajakaiye and Fakiyesi, 2009; Akingunola and Sangosanya, 2011; Alege et al., 2012; Olokoyo and Ogunnaike, 2012). The adverse effect of the global financial crisis on Nigeria's output performance could be traced to its negative impact on various macroeconomic fundamentals and economic sectors within the Nigerian economy. The crisis affected the contribution of most of the economic sectors to output. Its impact was felt through the Nigerian capital market and financial system, international crude oil price and ultimately the real sector.

The results of the estimation have shown that these external shocks, which were triggered by developments outside the Nigerian economy, can affect the

performance of Nigeria's output (GDP) in different ways. This was alluded to by Claessens and Kose (2013) when they noted that the financial crisis in many emerging markets were triggered by developments outside those markets. This crisis transmitted shocks into these markets through various macroeconomic variables, depending on the degree of global integration (economic or financial) of those economies (Claessens and Kose, 2013). Nigeria like other economies of the world, experienced cases of sudden stops in capital inflows (or capital reversals), fluctuations in commodity prices, large output losses, significant declines in other macroeconomic variables (consumption, investment and industrial production), financial variables followed suit and the inefficacy of domestic policies.

The above outcomes and behaviour of the variables are supported by the Minsky financial instability hypothesis (FIH) and the real business cycle (RBC) theory, given the degree of economic and financial integration of the economy with the rest of the world. The FIH posits that most economies were impacted by the shocks (transmitted through the crisis) via their financial investments in other economies. This is because of the critical role assigned to financial markets in some aggregate demand based theories (Minsky, 1975). Nigeria was not left out from the impact of the shocks (Sanusi, 2010e). Nigeria's output performance amidst other macroeconomic variables was impacted by the second round effect of the crisis through these shock variables which was accentuated by the country's high dependence on crude oil exports for her foreign exchange earnings. It was further accentuated through the reduction in capital inflow, as well as the effect of capital flight through portfolio investment on the financial sector (Soludo, 2009a; Sanusi, 2010e). Knell (2015) notes that the distortions from these shocks brought about fragility in financial markets and the economic system of many countries.

On the other hand, proponents of the RBC believe that these external shocks are distortionary and can come from various sources. The earlier proponents of the RBC evaluated external shocks only from the perspective of technological shocks. However, several literature has identified other shock variables such as oil price

shocks, monetary and fiscal shocks, terms of trade shocks, amongst others. Some of these shock variables have been used in this research and discussed above, and will be further discussed in subsequent sections using other tools. The shock variables discussed above accounts for fluctuations in Nigeria's output performance in response to exogenous changes or developments in these macroeconomic variables during the crisis. The use of these two theories in trying to understand the issue at hand is not unconnected with the fact that the global financial crisis was transmitted into the Nigerian economy through certain macroeconomic fundamentals. These macroeconomic fundamentals transmitted shocks into the economy, which impacted the country's output performance as discussed in this research.

5.3 The Generalised Impulse Response Function (GIRF) and Variance Decomposition (VDC) for the VAR Models

The primary focus of the study is to assess the impact of external shocks on output performance in Nigeria, and examine the long-run relationship between the shock variables and output. Thus, the analysis of the generalised impulse response function and the variance decomposition focuses only on the responses of the measure of Nigeria's output performance (real gross domestic product).

5.3.1 Generalised Impulse Response Function (GIRF)

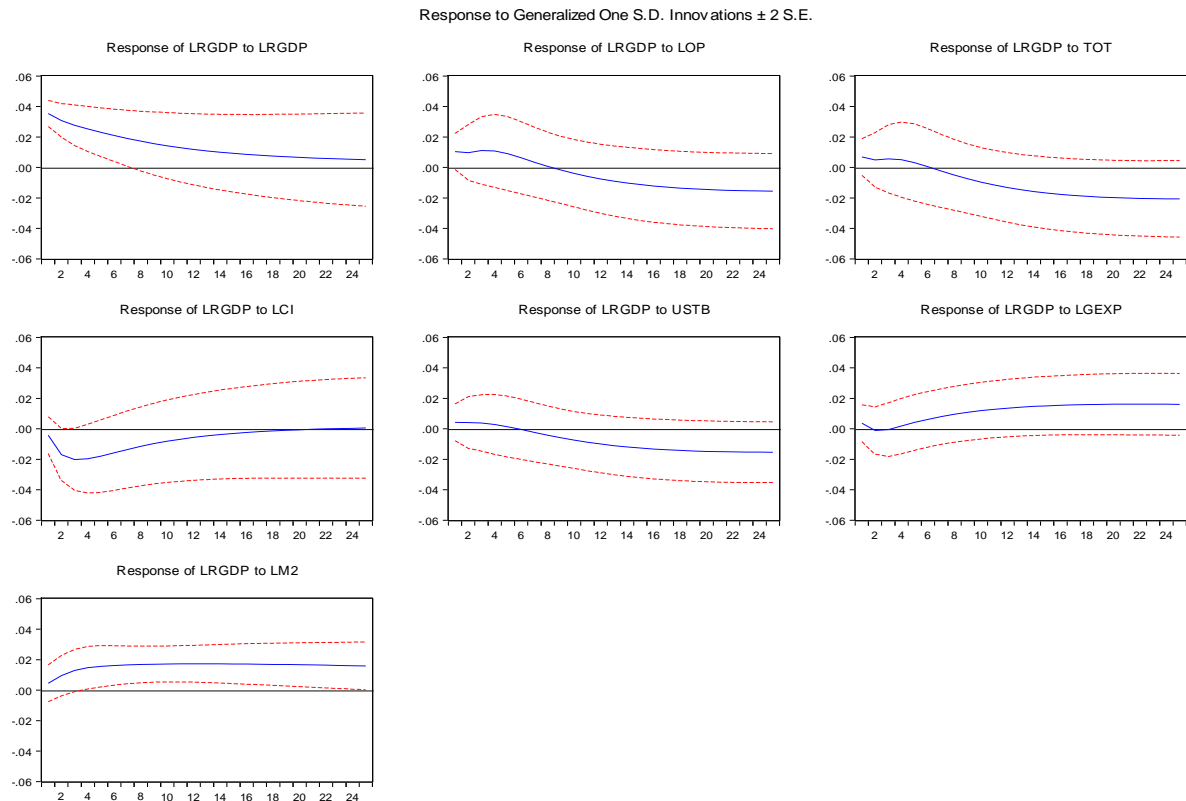
The generalised impulse response functions of model's A and B show the responses of total and non-oil real gross domestic products to a one standard deviation shock in each of the shock variables. The GIRF traces out the magnitude of the responsiveness of the dependent variable in the VAR model to shocks in each of the independent variables. The unrestricted VAR level has a standard error band of ± 2 S.E. The response is generated from a unit shock being applied to the error term of each variable in the equation in focus and the effect produced in the VAR is traced over time. In the VAR system, the specified forecast horizon to observe the dynamic effects of a unit shock to the defined external shock variables is 25 years. Figure 5.1 and 5.2 represent the charts of the output of the impulse

response functions generated from the VAR model. From these chart, the behavior or response of the variables to a one standard deviation shock can be observed. The figures represent the estimates of the generalised impulse response function for the level VAR of model's A and B.

From the generalised impulse response functions in Figures 5.1 and 5.2, the standard error bands are depicted by the two outer dashed lines in each chart. They represent the 95.0% confidence bands obtained from the asymptotic response of the standard errors. On the other hand, the line in the middle of the figure represents the impulse response function. The generalised impulse response function of the VAR model shows that the large response of output is due to own shock. This is consistent with the variance decomposition result in Tables 5.4 and 5.5, which shows that a shock to output accounted for the greater part of the variation in output performance over the horizon. Output performance remained positive over the horizon, though it was declining as the forecast horizon increased into the future. As expected, the result of the generalised impulse response for Model B follows the same pattern as the impulse responses for Model A. This is because real non-oil gross domestic product (LRGDP_N) which is the dependent variable (variable of interest) in Model B, constitutes the greater part of the total real GDP in Nigeria. It accounts for over 80.0% of total real GDP since after the 2014 GDP rebasing (CBN, 2014b).

Figure 5.1: Generalised Impulse Response of the Unrestricted VAR for Model

A



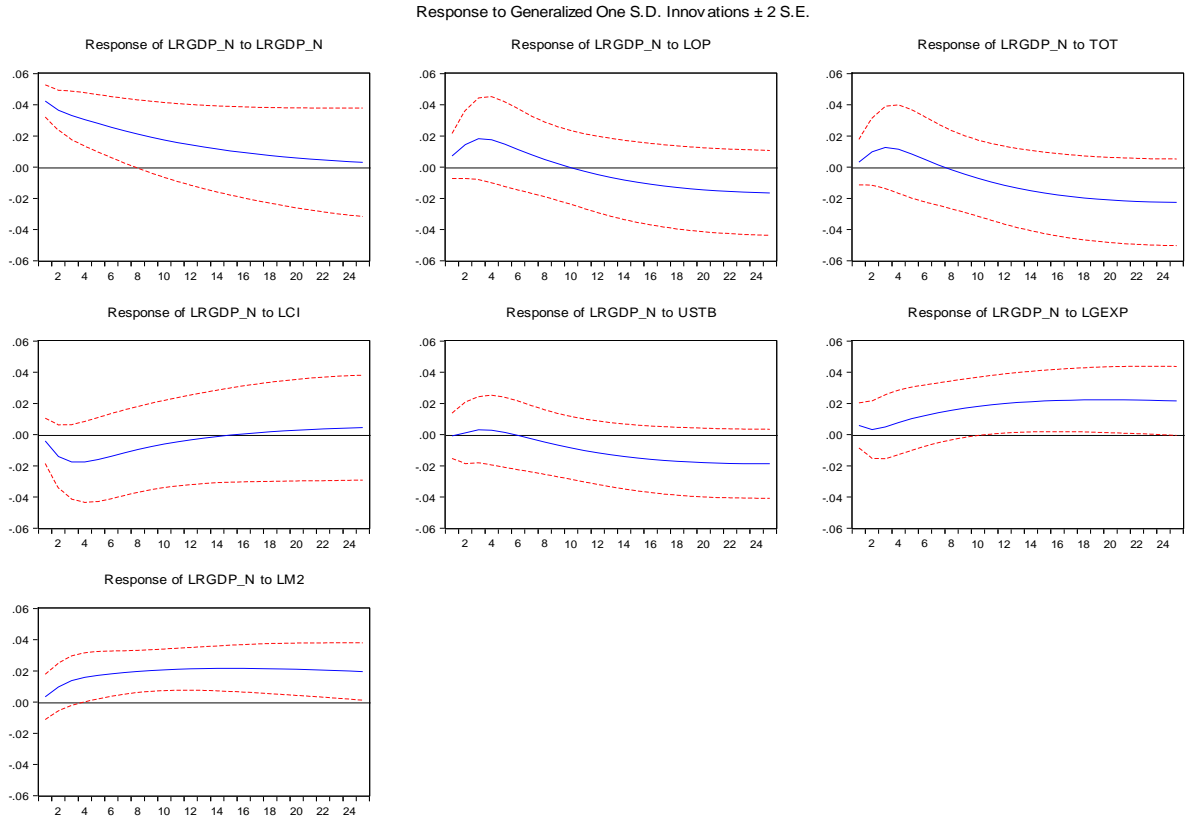
From the GIRF of Model A, a standard innovation to international crude oil price leads to a decrease in output performance for a greater part of the entire forecast horizon. The effect of the shock was positive up to about the 9th year when it crossed the zero line and became negative, persisting all through the forecast horizon. International crude oil price affects output performance through its impact on government revenue, exchange rate, and import prices, to mention a few. This kind of shock can be interpreted as an exogenous terms of trade effect (Broda and Tille, 2003). This finding is in tandem with the works of Farzanegan and Markwardt (2009) for net-oil exporting countries and Cologni and Manera (2008) for developed industrial economies. According to these studies, the impact of the shock from international crude oil price leads to a depreciation of the exchange rate both in the short- and long-run. This is because a positive shock in international crude oil price leads directly to higher inflation in the major trading partner's country. Thus, following the above thought process, in the case of Nigeria, the effect of the higher

inflation would bounce back to Nigeria through higher import prices, because the Nigerian economy is highly import dependent.

This trend and response are the same for a standard innovation in term of trade and the U.S. Treasury bond rate. In both cases, output performance remained negative for a greater part of the forecast horizon after crossing the zero line in about the 7th year for the term of trade and about the 6th year for the U.S. Treasury bond rate. The response persisted in both cases throughout the forecast horizon. The response of output performance to innovations in term of trade and the U.S. Treasury bond rate is in line with Izquierdo et al. (2008). Also, the response of output performance (real GDP) to fiscal policy (total government expenditure) and monetary policy (money supply) is positive. However, the response of output performance to a standard innovation in monetary policy is stronger than the response of output performance to fiscal policy. Output performance was zero and slightly negative between the 2nd and 3rd years, before responding positively to fiscal policy as the forecast horizon increased.

Furthermore, the response of output performance to a standard innovation in capital inflows was negative from the beginning of the forecast horizon and remained so for a greater part of the period. The effect of the shock began to fissile out and moved towards the zero line from about the beginning of the 17th year and died out from about the 20th year. This result could be attributed to the effect of the sudden stop episode during the crisis period, which was deteriorating (Calvo, 1998; Calvo et al., 2003; Calvo et al., 2004; Calvo and Talvi, 2005; Izquierdo et al., 2008).

Figure 5.2: Generalised Impulse Response of the Unrestricted VAR for Model B



In Model B, at the initial stage, the result shows that the large response of real non-oil domestic output performance in the system is due to own shock, although this gradually decreases over time. This means that the variable will return to the previous equilibrium value of zero if there are no further shocks over some periods. From Figure 5.2 it can be observed that there is an immediate response of real non-oil domestic output to own shock, but this begins to decline after the 2nd year. The response of real non-oil domestic output performance to international crude oil price, terms of trade and U.S. Treasury bond shock is quite high at the initial stage, but after the 3rd or 4th period, the effect continues to fall beyond the zero level and becomes negative over the rest of the forecast horizon. The response of real non-oil domestic output performance to innovations in terms of trade and the U.S. Treasury bond is in tandem with the works of Izquierdo et al. (2008).

Meanwhile, the response of LRGDP_N to a one standard deviation shock to capital inflows is negative and not significant up to about the 14th year; but it later picks up to a positive position, though the effect of the shock is still not significant. However, the response of LRGDP_N to a one standard deviation shock to fiscal and monetary policy is positive, and it continues after the twenty-fifth period. From the above results, it can be concluded that there is unidirectional Granger causality from the shock variables to non-oil real domestic output performance in Nigeria. However, the above results and subsequent results should be interpreted with caution. This is because the effect of a one standard deviation innovation in any of the shock variable is accompanied by a whole gamut of macroeconomic interactions.

5.3.2 Variance Decomposition (VDC)

The result of the variance decomposition estimates for model's A and B are presented in Tables 5.4 and 5.5. The forecast horizon is still 25 years to enable us see how the system progresses over time. Also, the contribution of the dependent variable's own shock and the shocks of other variables in the system are explained. The proportion of the forecast error variance in the variable of interest from innovations to itself and the other shock variables is derived from the variance decompositions. In this study, we are interested in how much of the future variations in output performance (as measured by the real gross domestic product and the real non-oil gross domestic product) are explained by shocks to itself, international crude oil price, terms of trade, capital inflows, U.S. Treasury bond, as well as fiscal and monetary policy.

In Model A, the variance decomposition of output performance showed that over the 25-year forecast horizon, terms of trade, money supply, capital inflows and international crude oil price shocks accounted for about 16.03%, 12.40%, 8.59% and 5.81% of the variations in output performance, respectively. Similarly, innovation to U.S. Treasury bond and government expenditure accounted for 4.04% and 2.86% of the variations in output performance over the forecast horizon,

respectively. However, own shock accounted for as much as 53.88% of the total variation in output performance. Examining the entire forecast horizon, it shows that the share of international crude oil price in the variability in output performance increased from 0.02% in the 2nd year to 1.60%, 6.43% and 15.57% in the 10th, 15th and 25th years, respectively. The result is in line with Österholm and Zettelmeyer (2008) and Sosa and Cashin (2013) who found that commodity price (such as international crude oil price) explained a significant part of the variance of the growth rate of aggregate Latin American output index and macroeconomic fluctuations in the Caribbean, respectively. The share of real domestic output declined rapidly from 88.62% in the 2nd year to 53.50%, 41.47% and 26.81% in the 10th, 15th and 25th years, respectively, in explaining itself. Furthermore, the portion of the variability in real domestic output performance explained by international crude oil price is not as large as expected. This confirms the assertion in the works of Olomola and Adejumo (2006) that oil price shocks have marginal and indirect effects on output.

Table 5.4: Variance Decompositions of the Unrestricted VAR for Model A

Variance Decomposition of LRGDP Explained by Shocks in								
Horizone (Years)	S.E.	LRGDP	LOP	TOT	LCI	USTB	LGEXP	LM2
2	0.05	88.62	0.02	1.61	6.63	0.47	0.11	2.55
4	0.07	72.34	0.46	5.45	13.08	1.81	0.10	6.76
6	0.08	64.48	0.39	8.77	13.79	2.71	0.50	9.35
8	0.09	58.81	0.61	11.90	12.75	3.35	1.21	11.37
10	0.10	53.50	1.60	14.78	11.26	3.91	2.02	12.94
15	0.12	41.47	6.43	20.19	8.02	4.95	3.77	15.18
20	0.14	32.68	11.58	23.25	6.09	5.56	4.90	15.94
25	0.16	26.81	15.57	24.94	5.03	5.90	5.57	16.13

The share of terms of trade and money supply tended to follow the same trend as that of international crude oil price. The variance decomposition table shows that the contribution of terms of trade to the variability in output performance increased from 1.61% in the 2nd year to as much as 20.19% and 24.94% in the 15th and 25th year, respectively. This result is consistent with the findings of Hernández (2013) who found that the quarterly growth of GDP is positively and significantly affected

by variations in terms of trade. The author noted that terms of trade explain 1/3 of GDP growth variability in Colombia.

Similarly, Jääskelä and Smith (2013) notes that positive terms of trade have an expansionary effect, but not necessarily inflationary. Monetary policy accounted for 2.55%, 15.18% and 16.13% of the variability in output performance in the 2nd, 15th and 25th year. This result shows rapid increases in the share of monetary policy in accounting for the variability in output performance, which is consistent with Christiano et al. (1999), and Apere and Karimo (2015). The contributions of capital inflows, U.S. Treasury bonds and fiscal policy seem to be small over the forecast horizon. Over the 25-year forecast horizon, U.S. Treasury bond and total government expenditure (a measure of fiscal policy) accounted for 0.47% and 0.11% in the 2nd year, respectively, and 5.90% and 5.57% by the 25th year, respectively. On the other hand, the contribution of capital inflows to the variability in output performance increased from 6.63% in the 2nd year to as much as 13.79% in the 6th year. However, its share declined from there on to about 8.02% and 5.03% in the 15th and 25th year, respectively.

The above result implies that a contemporaneous shock in international crude oil price, terms of trade and money supply would have a much greater effect on output performance over time. In other words, the variability in output performance due to own shock would decrease over an extended period following a contemporaneous shock in these variables, except there is an intervention by the monetary or fiscal authorities to cushion the effect of the shock. Interventions in the dynamics in international crude oil market by the Organization of the Petroleum Exporting Countries (OPEC), an intergovernmental organisation of 14 nations (of which Nigeria is a member) would go a long way to determine the direction and magnitude of the impact of a shock in international crude oil price. The primary objective of OPEC is to ensure that the international crude oil market is stable and that its members and other participants adhere to the market rules. Similarly,

intervention by the government to cushion the effect of adverse terms of trade shock would prevent an undesirable impact on output performance.

Consequently, with respect to the magnitude of the impact of the shock variables on Nigeria's output performance, the result of the variance decomposition of the unrestricted VAR showed that international crude oil price, terms of trade and money supply (monetary policy) play a greater role in influencing real domestic output performance in Nigeria. These shock variables have a strong influence on real output performance in the Nigerian economy. This is quite true of the Nigerian economy given the role of the monetary authority in economic management in Nigeria, Nigeria's high dependency on revenue from crude oil and the central role of trade in driving economic activity in the country.

Table 5.5: Variance Decompositions of the Unrestricted VAR for Model B

Variance Decomposition of LRGDP_N Explained by Shocks in								
Horizon (Years)	S.E.	LRGDP_N	LOP	TOT	LCI	USTB	LGEXP	LM2
2	0.06	92.15	2.08	0.32	3.00	0.95	0.00	1.50
4	0.08	78.08	5.91	2.37	6.91	2.05	0.44	4.23
6	0.10	71.08	5.83	5.05	7.46	2.60	1.59	6.38
8	0.11	65.70	4.85	8.16	6.78	3.16	2.91	8.44
10	0.12	60.21	4.17	11.47	5.87	3.78	4.22	10.29
15	0.14	46.51	4.98	18.85	4.18	5.18	6.79	13.51
20	0.16	35.87	7.69	23.64	3.54	6.09	8.20	14.97
25	0.18	28.84	10.44	26.35	3.44	6.59	8.87	15.48

Table 5.5 shows the result of the variance decomposition of the unrestricted VAR for Model B. The result reveals that the forecast error in real non-oil domestic output performance can be attributed to innovations in the shock variables over the 25-year forecast horizon. The forecast error variance of LRGDP_N in the system is mainly due to own innovation (averaging about 54.87% over the 25-year forecast horizon). Over time, the variations in LRGDP_N from innovations to other variables show a tendency to increase gradually. Innovations to LOP, TOT LCI, USTB, LGEXP and LM2 explain on the average about 5.80%, 14.62%, 4.65%, 4.42%, 5.30% and 10.68%, respectively of the variability in LRGDP_N.

The result from Model B reaffirms the results in Model A, which showed that international crude oil price; terms of trade and money supply are significant in the determination of the variations in output performance in the Nigerian economy. Though Model B follows the same trend as Model A, the share of the variability in real non-oil domestic output performance that is accounted for by innovations in total government expenditure and U.S. Treasury bond increased in Model B, relative to Model A. This increase could be seen throughout most of the forecast horizon.

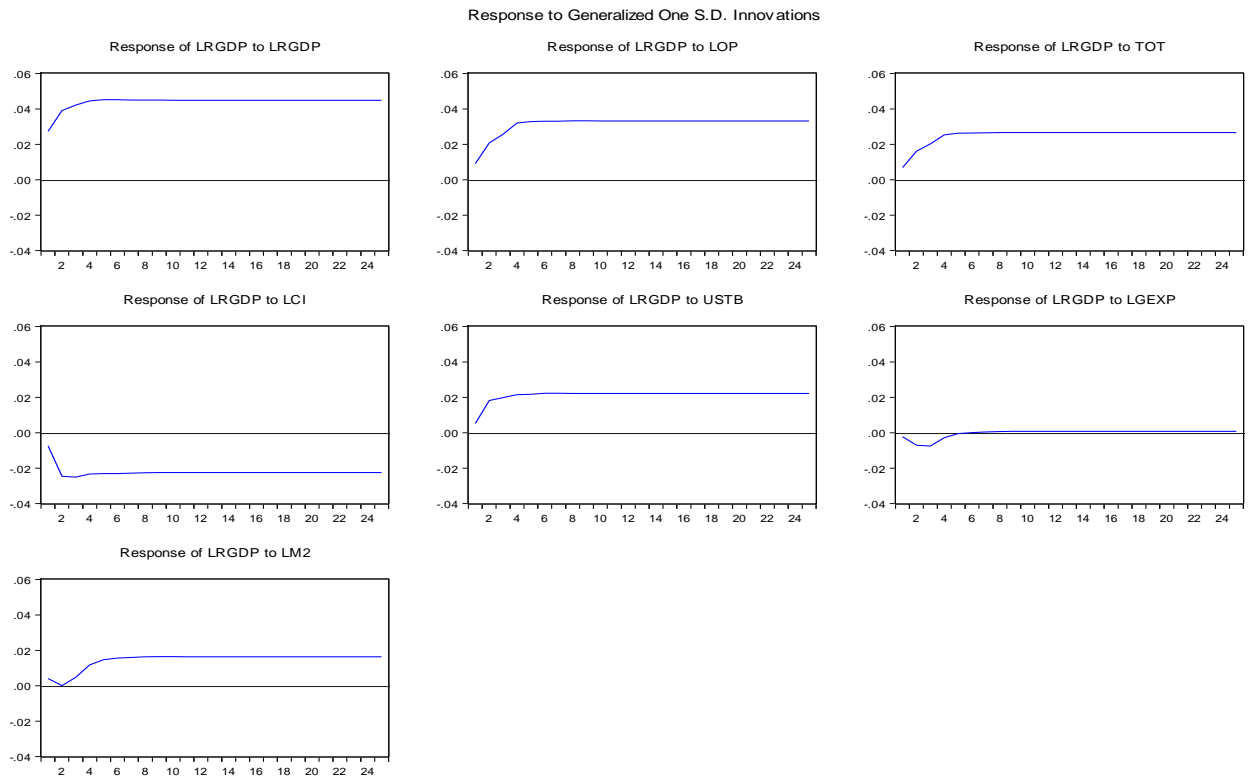
5.4 Generalised Impulse Response Function (GIRF) and Variance Decomposition (VDC) for the VECM Models

5.4.1 Generalised Impulse Response Function (GIRF)

The result of the impulse responses for the VEC for Models A and B are presented in Figures 5.3 and 5.4. The impulse response function of the VEC is based on a theoretical restriction and has no error band.⁴ For Model A as shown in Figure 5.3, a positive one standard deviation innovation to international crude oil price, terms of trade, U.S. Treasury bond and money supply results in a high and positive response in output performance over the forecast horizon. Also, the figure shows that the huge response in output performance was mainly due to own shock. The shock to international crude oil price, terms of trade, U.S. Treasury bond, and money supply, as well as output performance own shock, led to a positive response in output performance up to about the 5th and 6th year before the magnitude of increase became steady over the forecast horizon. The response function of output performance to innovations in these variables in the VECM is akin to that of the VAR.

⁴ Eviews 9 does not have a standard error band for impulse response functions at the VEC level

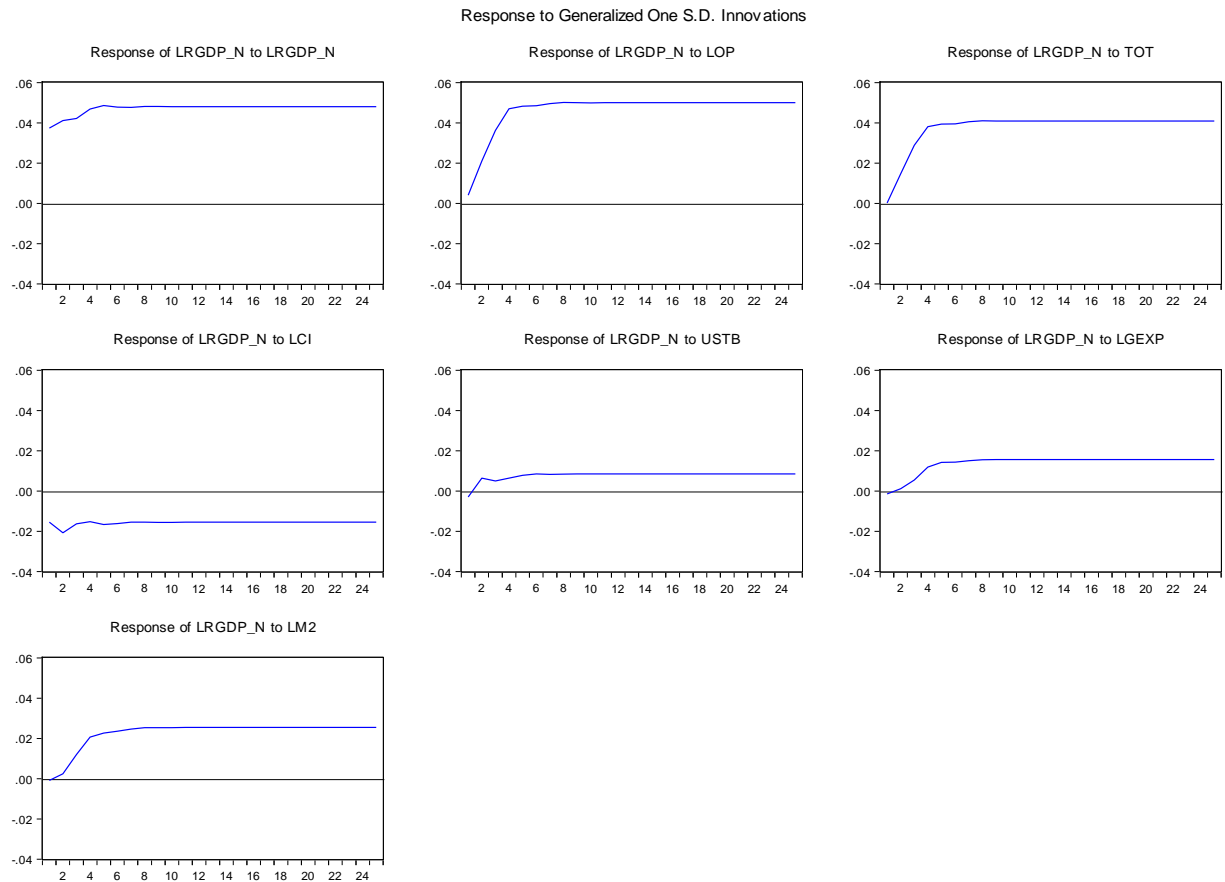
Figure 5.3: Generalised Impulse Response of the VECM for Model A



A shock to total government expenditure results in a negative response in output performance up to about the 5th and 6th year. Subsequently, there was zero response over the forecast horizon. A one standard deviation innovation in capital inflows leads to a negative response in output performance throughout the period, with its lowest point at about the 2nd and 3rd year. This implies that output performance is not very responsive to capital inflows in Nigeria. This could be attributed to the fact that most of the capital inflow into the country goes to the oil sector which contributes just about 20.0% to total real domestic output. Also, part of the capital inflow is made of portfolio investment, which mostly goes into the banking sector and capital market. Furthermore, the response of output performance in the VEC to fiscal policy is suggestive of the channel through which government expenditure impacts on output performance, through aggregate demand (consumption and investment).

The result for Model B in Figure 5.4, indicate that the response of real non-oil domestic output performance to innovations in own shock, international crude oil price and terms of trade was quite strong and positive. There was a sharp and positive increase in real non-oil domestic output performance up to about the 5th year in the three cases. The increase died out from about the 6th year and remained positive over the 25-year forecast horizon period. The response of real non-oil domestic output performance to innovation in international crude oil price is expected. International crude oil price plays a vital role in the generation of government revenue which is used to support the real sector. Also, in terms of export, most of Nigeria's exports are primary products and semi-manufactures, such that innovations to international crude oil price will impact on non-oil real output performance. Furthermore, the Nigerian economy is highly import dependent, so the response of real non-oil domestic output performance to innovations in terms of trade is expected.

Figure 5.4: Generalised Impulse Response of the VECM for Model B



The response of real non-oil domestic output performance to innovations in U.S. Treasury bond, government expenditure and money supply was also slightly strong and positive over the forecast horizon period. The response was sharp and positive up to about the 6th year, and the effect remained positive throughout the period. The response of real non-oil domestic output performance to capital inflows shock is negative and not significant over the forecast horizon. The overall results of the impulse response function with restriction indicate a unidirectional causality from the shock variables to real non-oil domestic output performance (LRGDP_N). The evidence here is consistent with the long-run causality within the VECM framework, the short-run VECM Granger causality/Block Exogeneity Wald test and with the unrestricted level VAR.

5.4.2 Variance Decomposition (VDC)

Table 5.6 below present the variance decomposition estimates for the VEC of Model A with normalisation on the real gross domestic product (LRGDP). The forecast horizon is still 25 years, and the contribution of a one standard deviation shock to the shock variables, as well as the dependent variable own shock in the system are explained. Masih et al. (2009) explained that in a VECM, the variance decomposition function can be used to determine the degree of endogeneity or exogeneity of a variable, and dictate an endogenous or exogenous variable in the system. Therefore, an exogenous variable could be a variable which is mainly explained by own shock and less by the other variables in the system. Taking a cursory look at the result from the VECM and comparing it with the unrestricted VAR, the result showed that the qualitative natures of the macroeconomic linkages are basically the same. However, the magnitude and intensity of response of the variable of interest are significantly higher in the unrestricted VAR, compared to the VECM. The contribution of each of the shock variables to the variations in output performance is greater in the VAR than in the VECM. This could be attributed to the differencing technique which is implicit in the VECM.

Table 5.6: Variance Decompositions of the VECM for Model A

Variance Decomposition of LR GDP Explained by Shocks in								
Horizon (Years)	S.E.	LR GDP	LOP	TOT	LCI	USTB	LGEXP	LM2
2	0.05	86.17	2.58	1.12	9.39	0.04	0.34	0.37
4	0.09	79.00	7.29	2.89	9.13	0.36	0.71	0.61
6	0.11	76.54	9.68	3.42	8.10	0.44	0.42	1.37
8	0.14	75.34	10.79	3.68	7.64	0.45	0.29	1.80
10	0.16	74.67	11.42	3.82	7.34	0.46	0.23	2.06
15	0.20	73.86	12.18	4.00	6.97	0.46	0.15	2.38
20	0.23	73.48	12.54	4.08	6.80	0.47	0.11	2.53
25	0.26	73.26	12.74	4.12	6.71	0.47	0.09	2.61

For instance, looking at the variance decomposition table over the 25-year horizon, variables such as terms of trade, money supply, capital inflows, international crude oil price, U.S. Treasury bond and government expenditure have a substantially larger share in the unrestricted VAR compared to the VECM results. The contributions of these variables to the variations in output performance over the forecast horizon in the unrestricted VAR averaged 16.03%, 12.40%, 8.59%, 5.81%, 4.04% and 2.86%, respectively. While their contributions in the VECM over the same period averaged 3.22%, 1.91%, 7.66%, 9.93%, 0.37% and 0.28% in the same order. Furthermore, the contribution of the dependent variable's own shock to the variability in output performance is greater in the VECM than in the unrestricted VAR at the end of the forecast horizon. By the 25th year, own shock accounted for 26.86% of the variability in output performance in the unrestricted VAR and 73.25% in the VECM. Own shock averaged 76.44% for the VECM, while it was an average of 53.88% for the unrestricted VAR over the 25-year forecast horizon. This implies that the unrestricted VAR model outperformed the VECM, because it is expected that as we move further into the horizon, own shock's contribution is supposed to be declining. Furthermore, the VAR yields a closer interaction between the dependent variable (output performance) and the shock variables than the VECM estimates and makes sense realistically.

Overall, the result of the estimated variance decomposition of the VECM suggests that most of the variations in Nigeria's output performance are accounted for by

international crude oil price, terms of trade and monetary policy (money supply). This is reflected in the magnitude of the contribution of these shock variables to the variability in Nigeria's real domestic output performance over the forecast horizon. The strong influence of these variables on the Nigerian economy cannot be overlooked. Also, capital inflow is highlighted in the VECM as a relatively significant shock variable too. This we can allude to, given the magnitude of capital inflow into the oil sector and the contribution of the sector to government revenue and foreign exchange earnings.

Table 5.7 presents the result of the variance decomposition at the VEC level for Model B with normalisation on LRGDP_N. The result indicates that a large percentage of the forecast error variance in real non-oil domestic output performance is due to own innovation (about 56.60%) over the 25-year forecast horizon period. International crude oil price accounted for 34.31%, while 2.26% is due to terms of trade and 4.24% attributed to U.S. Treasury bond. Similarly, 0.14% of the variability in LRGDP_N is accounted for by capital inflows, while fiscal and monetary policies account for 0.11% and 2.33%, respectively.

Table 5.7: Variance Decompositions of the VECM for Model B

Variance Decomposition of LRGDP_N Explained by Shocks in								
Horizone (Years)	S.E.	LRGDP_N	LOP	TOT	LCI	USTB	LGEXP	LM2
2	0.06	89.63	7.99	1.14	0.92	0.25	0.02	0.05
4	0.10	64.16	27.88	2.11	0.32	4.08	0.33	1.11
6	0.14	57.52	33.57	2.27	0.17	4.45	0.18	1.84
8	0.17	54.26	36.18	2.38	0.12	4.63	0.13	2.29
10	0.20	52.61	37.52	2.43	0.10	4.69	0.10	2.55
15	0.25	50.60	39.12	2.50	0.07	4.76	0.07	2.87
20	0.30	49.71	39.83	2.53	0.06	4.79	0.06	3.02
25	0.34	49.20	40.24	2.55	0.05	4.81	0.06	3.10

This is just about consistent with the estimate of the variance decomposition of the unrestricted VAR and result of the generalised impulse response function of the VECM. The share of innovations due to own shocks dropped from 89.63% in the 2nd year to 49.20% by the 25th year, while the share of international crude oil price

increased markedly from 7.99% in the 2nd year to 40.24% by the 25th year. The contribution of capital inflows and government expenditure continued to decrease throughout the forecast horizon to as low as 0.05% and 0.06%, respectively by the 25th year. Terms of trade, U.S. Treasury bond and money supply maintained a slow but steady increase throughout the sample period.

In relation to the contribution of the dependent variable's own shock to the variability in real non-oil output performance in both the unrestricted VAR and the VECM, the share of own shock is greater in the VECM than in the unrestricted VAR at the end of the forecast horizon and over the period. By the 25th year, own shock accounted for 28.84% of the variability in real non-oil output performance in the unrestricted VAR and 49.20% in the VECM. Over the forecast horizon period, own shock averaged 56.60% for the VECM, while it was an average of 54.87% for the unrestricted VAR. This implies that the unrestricted VAR model outperformed the VECM in both Models A and B.

5.5 Summary

This chapter seeks to empirically examine the impact of external shocks on Nigeria's output performance using annual data over the period 1981-2015. To investigate this relationship and achieve the stated objective, the study uses a multivariate Vector Autoregression (VAR) and Vector Error Correction Model (VECM) framework. These techniques helped to evaluate the long-run relationships between Nigeria's output performance (real gross domestic product) and the shock variables (international crude oil price, terms of trade, capital inflows, U.S. Treasury bond, total government expenditure for fiscal policy, money supply (M2) for monetary policy, and a dummy to capture the global financial crisis). The study also establishes the long-run causality between Nigeria's output performance and the respective shock variables, as well as the existence of at most one cointegrating vector in each of the two models using the Johansen cointegration technique.

The study used the generalised impulse response function (GIRF) which is invariant of the ordering of the variables and the variance decompositions (VDC) analytical tools of the VAR technique to evaluate the impact of the shocks. The GIRF and VDC are used to evaluate the interrelationships among the variables of interests. Using the Granger causality/block exogeneity test and the error correction term in the VECM framework, the empirical investigation suggests that there exist both short-run and long-run relationships amongst the variables. The investigation also indicates that Model A (LRGDP) and Model B (LRGDP_N) behave and respond in the same way to innovations in the shock variables. The impulse response functions (IRFs) indicate that external shocks (LOP, TOT, LCI, USTB) and domestic policies (monetary and fiscal policies) have short-run effects on Nigeria's output performance in the immediate year of initial shocks. Also, the global financial crisis variable in the short-run VECM shows that Nigeria's output performance was negatively affected by the GFC, which was quite expected. Similarly, the variance decompositions (VDCs) shows that all the measures of external shocks and domestic policies display some viable information in explaining the variabilities in Nigeria's output performance over the forecast horizon. With respect to the performance of the two methodological approaches adopted in the study, the comparison between the result of the VECM and the unrestricted VAR show that the unrestricted VAR model outperformed the VECM.

The high dependency of the Nigerian economy on international crude oil and imports, and the increased global economic and financial integration exposed the economy to severe economic and financial shocks. This is evident in the respective shares of the shock variables that account for the variabilities in Nigeria's output performance in the variance decomposition tables. This brings to the fore the need for government and the financial authorities to fortify the economy, thus creating shock absorbing measures to cushion the effect of external shocks on the economy. The recent global financial crisis highlighted the degree of exposure of the Nigerian economy to external vulnerabilities, the extent of her financial integration with the rest of the world, as well as the increased trade

connectedness. The Nigeria's experience from the recent crisis shows how the real sector is linked to the rest of the world through the financial system and other macroeconomic variables. Hence the need to channel financial sector funds to the productive sectors of the economy, while the monetary authorities pursue appropriate policies to fortify the economy. A more detailed discussion and potential policy implications of the results will be discussed in the subsequent chapter.

Chapter Six

Conclusion and Recommendation

6.1 Introduction

This chapter presents a summary of the thesis and draws conclusions on the impact of external shocks on Nigeria's output performance (measured by the real gross domestic product). Assessing and understanding the importance of external factors in the performance of major economic fundamentals in developing and emerging market economies cannot be overemphasised, given its impact on economic performance. Economic performance cannot be assessed based on sound and robust macroeconomic policies driven by sound macroeconomic fundamentals alone, but also by the resilience of the economy to external shocks. Furthermore, effective and efficient economic management should incorporate the ability of policymakers to identify and proffer policies to mitigate these shocks. Also, they should be able to seek ways to effectively distil the effect of sound macroeconomic policies on output performance in the absence or presence of significant influence of external factors.

This thesis examines the impact of external shocks on Nigeria's output performance in the context of the global financial crisis. This is because the degree of exposure to and dependency of the Nigerian economy on the rest of the world has made the economy more vulnerable to external shocks. The period of the crisis saw the Nigerian economy being exposed to various kinds of shocks from other jurisdictions. Consequently, the need to efficiently account for, mitigate and measure the effect of these shocks and their impact has brought to the fore several empirical questions. Questions such as: what is the role of external shocks in the performance of key macroeconomic fundamentals? Which of these external shocks account for a larger proportion of real output fluctuations? And how do important macroeconomic variables respond to these shocks? It is the need to sort for answers to such questions that gave rise to this research.

To this end, the study used the vector autoregression (VAR) methodology to investigate the impact of these shocks on Nigeria's output performance because the methodology is flexible and easy to use for multivariate time series analysis. The VAR model has also been widely used in studies of this nature to investigate similar issues. Furthermore, the impulse response functions (IRF) and forecast error variance decompositions (VDC) generated from the VAR have proven to be useful analytic tools for macroeconomic policy analysis. The time path of each of the shock variables is traced from the IRF, while the VDC which complements the IRF accounts for the contribution of each of the shock variables to the variation in Nigeria's output performance. Consequently, subsequent sections will discuss the research findings, some policy implications, the limitations of the study and suggestions for future research.

6.2 Summary of the Thesis

The purpose of this study is to investigate the impact of external shocks on Nigeria's output performance within the context of the global financial crisis. The investigation is carried out by examining the impact of international crude oil price, terms of trade, capital inflow and U.S. 10-year treasury bond rate on the real gross domestic product in the face of the global financial crisis. The global financial crisis was introduced into the model as a dummy variable and was modelled as an exogenous variable in accordance with the procedure in the methodology. The real gross domestic product was further separated into real oil and non-oil gross domestic product. This was to allow the research to evaluate the impact of these shocks on one of the broad categorisations of Nigeria's gross domestic product. Additionally, given that these shock variables would not just act in isolation on the economy, the study incorporated government expenditure (fiscal policy) and money supply (monetary policy) into the model. These two variables were to capture the impact of domestic policies on Nigeria's output performance in the face of these external shocks. This study used annual macroeconomic data from the Central Bank of Nigeria (CBN) and the International Monetary Fund (IMF) - International Financial Statistics (IFS) for the period 1981 – 2015. This period

coincides with the period for which new and more robust data on major macroeconomic variables for the country has been revised based on the 2014 GDP rebasing.

In Chapter 2, the study reviewed definitional and conceptual issues on financial crisis, its causes and classification, as well as some insight into the 2007/2008 global financial crisis. Also discussed in the chapter were theories that could best explain the global financial crisis and how external shocks are transmitted into the economy. Given the multiplicity of factors that are responsible for the different crisis and the channels of transmission of the shocks, there was no convergence on which theory was the best theoretical explanation of the issues. However, the discussion was narrowed down to two theories: the Minsky's financial instability hypothesis (FIH) and the real business cycle theory (RBC). From the review of the literature, empirical studies on the impact of financial crisis and external factors on various macroeconomic variables were examined. Consequently, it was found that the findings from past and current studies on the impact of external shocks were mixed owing to context, the referenced shock variable(s), methodologies used, as well as the target variable of interest. Finally, the last section of the chapter assesses methodologies used in previous impact studies and found that the VAR methodology was widely used due to its advantages and usefulness for policy purposes.

In Chapter 3, the Nigerian economy is put under the searchlight as the study reviews the economy, its various sectors and performance over the review period. The performance of the sectors discussed is evaluated based on the impact of the global financial crisis on the Nigerian economy, the outcomes, as well as the measures taken by both the Government and the Central Bank of Nigeria to mitigate the effects of the crisis. In Chapter 4, the impact of the shock variables on Nigeria's output performance was studied, using two models. The first model was used to investigate the impact of external shocks on total real gross domestic product, while the second model was employed to investigate the impact of the

selected external shock variables on one of the two broad categories of Nigeria's gross domestic product (non-oil gross domestic product).

The relevant transformations into logarithms was applied to the data, and the ADF, PP, DF-GLS and KPSS tests were employed to test for stationarity of the data. The appropriate lag length was selected, while cointegration was established using the Johansen cointegration technique for the VAR and the error correction term in the VECM. Both the long run and short run causality test were assessed, and the required diagnostic tests carried out on the estimated models. The vector autoregression model (VAR) and the vector error correction model (VECM) were used to estimate the existing relationships. This was to compare the results from both approaches to see which would outperform the other. The outcomes suggested that the VAR model outperformed the VECM for both models. The generalised impulse response function (GIRF) and the variance decomposition (VDC) were used to analyse the impact of the shock variables in the model for policy analysis. The results from the estimation of the model are presented in chapter 5, while the conclusion and recommendation follow in chapter 6.

6.3 Empirical Results

The focus of this thesis is to empirically examine the impact of external shocks on Nigeria's output performance. The real gross domestic product is used to measure Nigeria's output performance, while the shock variables used were international crude oil price, terms of trade, capital inflows, U.S. Treasury bond, total government expenditure for fiscal policy, money supply (M2) for monetary policy, and a dummy to capture the global financial crisis. The multivariate Vector Autoregression (VAR) and Vector Error Correction Model (VECM) framework were used to evaluate the impact and to achieve the stated objective. The study establishes the long-run causality between Nigeria's output performance and the respective shock variables and found at most one cointegrating vector in each of the two models using the Johansen cointegration technique.

Findings from the study show that, the impulse response functions (IRFs) indicate that external shocks (LOP, TOT, LCI, USTB) and domestic policies (monetary and fiscal policies) have short-run effects on Nigeria's output performance at the immediate year of initial shocks. Similarly, the variance decompositions (VDCs) shows that all the measures of external shocks and domestic policies display some viable information in explaining the variabilities in Nigeria's output performance over the forecast horizon. The study shows that Nigeria's output performance responded negatively to the global financial crisis, confirming earlier works by Ajakaiye and Fakiyesi (2009); Akingunola and Sangosanya (2011); Alege et al. (2012); and Olokoyo and Ogunnaike (2012).

Similarly, with respect to the government expenditure variable, the study found that output performance responded positively to innovation in government expenditure. This is plausible because in the composition of Nigeria's total government expenditure, in the last 20 years, the recurrent expenditure has been about 70.0% of the total. This goes to salaries and wages given the huge size of Nigeria's public and civil servants. This then translates to a huge amount for consumption spending which feeds into the output equation. Thus, the finding from this thesis is in tandem with many studies which have found a positive response of output to a shock in total government spending. Furthermore, the findings of this study is inline with the Keynesian macroeconomic theory. Government is a major player in the Nigerian economy (largest employer of labour, huge investment in infrastructure and a huge consumer of goods and services). Government expenditure stimulates aggregate demand and impacts almost immediately on output performance, even though output performance will respond with a lag.

Cheng (2003) found that innovations in monetary policy and fiscal policy significantly affect real GDP in Malaysia. Christiano et al. (1999) in their study found that monetary policy shock had a significant impact on the volatility of aggregate output, as it accounted for 22.4%, 43.1% and 35.0% of the variability in aggregate output in the 4th, 8th and 12th quarter, respectively. The results from

these studies and many others are consistent with the findings of this research, thus, in a crisis period, the monetary authority should introduce shock to money supply (increase money supply) to spur economic activities within the economy and thereby maintain a positive output performance. It is expected that the increase in money supply would act by reducing interest rate and increasing investment. Furthermore, the response of output performance to a standard innovation in monetary policy is stronger than the response of output performance to fiscal policy. This result is corroborated by the findings of Nidhiprabha (2010) who used VAR to investigate the macroeconomic policy in Thailand from July 1997 to September 2001, and found that monetary policy seemed to be more effective than fiscal policy.

International crude oil price is a cross-cutting variable as far as the Nigerian economy is concerned because it affects the whole facet of the economy given our dependence on crude oil. Its impact on output performance can be traced through various channels such as, government revenue, exchange rate, import prices, to mention a few. This kind of shock can be interpreted as an exogenous terms-of-trade effect (Broda and Tille, 2003). The finding from this research is in tandem with the works of Farzanegan and Markwardt (2009) for net-oil exporting countries and Cologni and Manera (2008) for developed industrial economies. Also, the result is in line with Österholm and Zettelmeyer (2008) and Sosa and Cashin (2013) who found that commodity prices (such as international crude oil price) explained a significant part of the variance of the growth rate of aggregate Latin American output index and macroeconomic fluctuations in the Caribbean, respectively. This could be attributed to the fact that while Nigeria as an oil producing country would benefit positively from an increase in international crude oil price via its impact on oil revenue, the country would also be affected negatively through increased cost of production and overheads (inflation) in Nigeria and from other countries. The high crude oil price translates to higher energy cost in both Nigeria and the rest of the world, thus increasing the cost of running businesses and production, transportation and other associated cost. This could eventually

knock off the positive gains since Nigeria has a high dependency level on imported finished goods and raw materials from other countries of the world to sustain the economy.

The result of the study showed that output performance responded rapidly to innovations in terms of trade and U.S. Treasury bond. A positive innovation will increase output performance in the short run, and vice versa and this result is consistent with the finding of (Izquierdo et al., 2008; Hernández, 2013; Jääskelä and Smith, 2013). Government investment in U.S. Treasury bond and the gains from such investment is dependent on the rate on the bond. Hence, a positive innovation to this variable is expected to yield returns, which is ultimately invested in the productive sector of the economy. Similarly, a positive terms of trade is expected to have an expansionary effect, but not necessarily inflationary. Output performance responded negatively to capital inflows. The result implies that capital inflows can have deteriorating effects arising from a sudden stop episode, given the large and unexpected nature of sudden stops (Calvo, 1998; Calvo et al., 2003; Calvo et al., 2004; Calvo and Talvi, 2005; Izquierdo et al., 2008). A possible explanation for this behaviour as suggested by Calvo et al. (2006) lies in the nature of the changes in the sources of financing in times of external financial crisis. The nature of capital inflow in Nigeria is basically directed to the oil sector which contributes only about 20.0% to the total GDP, as well as portfolio investment in the financial sector and the capital market. The shocks from such inflows can be very immediate and spontaneous and can have devastating effects on the economy.

In the VECM model, the error correction term measures the long-run effect that a given variable or shock exerts on another variable. However, this is explained through the concept of half-life, that is, the time needed to eliminate about 50.0% of the deviation. From the study, the half-life time in years that it would take Nigeria's output performance in the two models to revert to its long-run equilibrium level in the face of a standard innovation in the shock variables is given at 2.2 for Model A

and 1.8 for Model B. This gives the length of time in years. The result reaffirms the statistical significance of the error correction term and the fact that the adjustment coefficients are valid.

With respect to the performance of the two methodological approaches adopted in the study, the comparison between the result of the VECM and the unrestricted VAR show that the qualitative natures of the macroeconomic linkages are the same in both approaches. Also, in the unrestricted VAR the response of the variable of interest to innovations in the shock variables is significantly higher and more intense than in the VECM. The share of each of the shock variables in accounting for the variability in output performance is greater in the VAR compared to the VECM. This could be attributed to the differencing technique which is implicit in the VECM. Also, the contribution of own shock to the variability in output performance is greater in the VECM than in the unrestricted VAR at the end of the forecast horizon. This could be that the VECM could not capture much of the responses from the shock variables, due to the loss of vital information in the data from the differencing process. Therefore, allowing for own shock to account for a greater share of the variability in output performance in the VECM. The VAR yields a closer interaction between the dependent variable (output performance) and the shock variables than the VECM estimates and makes sense realistically. This implies that the unrestricted VAR model outperformed the VECM.

This thesis has three research questions. Firstly, to evaluate the impact of external shocks on Nigeria's output performance. The overall results of the study confirm the view about the high vulnerability of the Nigerian economy to external shocks. These shocks represent a major source of economic fluctuations in the country, explaining more than half of the variance of real output performance at standard medium-term horizons. The results show that external shocks or external factors, depending on the shock variable, have varying effects on output performance in Nigeria. The result shows that international crude oil price, capital inflows, terms of trade and U.S. Treasury bond have an adverse impact on Nigeria's output

performance in the long run, while monetary and fiscal policies have a positive impact on output performance in the long run. This notwithstanding, depends on the nature of the innovation to the shock variables. In the same vein, the global financial crisis impacted negatively on Nigeria's GDP performance over the period through the shocks it transmitted into the economy. The implication of this for the Central Bank and the Federal Government is that these external shocks hamper the efficacy of monetary and fiscal policies. They tend to distort the desired outcomes of macroeconomic policy objectives, hence, the need to adequately measure and mitigate these shocks. What this means is that a great deal of care should be taken when evaluating the success or failure of domestic macro policies and reforms. A period of stagnation and even crisis may not necessarily reflect bad policy, but a consequence of adverse external conditions. Conversely, a sustained period of high growth may not be the consequence of good policies, but the result of favourable external conditions. Summarily, given the large incidence of external conditions in Nigeria due to her interactions with the rest of the world, the judgment of the success - or failure - of economic policies and performance should not be made in a vacuum, but rather, by factoring in external conditions before signalling thumbs up - or down.

Secondly, the study investigated the dynamic response of output performance to each of the shock variables. The dynamic response of output performance to each of the defined shock variables is traced from the impulse response function charts. The charts show that output performance responds rapidly to the external shock variables, while its response to the domestic economic condition variables is seemingly moderate and not as rapid as in the case of the external shock variables. Finally, one of the research questions of this study is to determine which of the shock variables have a greater impact on Nigeria's output performance. Hence, the variance decomposition is used to quantify the relative importance of each of the shocks as sources of output fluctuations in Nigeria. Thus, the variance decomposition tables for both the unrestricted VAR and the VECM show that international crude oil price and terms of trade have the largest share in accounting

for the variability in output performance. These are closely followed by the shares of capital inflows and monetary policy (money supply as measured by M2).

6.4 Some Policy Implications

Given that these external shocks can hamper the efficacy of macroeconomic policies (particularly, monetary and fiscal), the Central Bank as the economic think tank of the country needs to find a plausible means of correctly identifying and assessing the sources of and adjustment mechanisms to these external disturbances. This is important not only to understand the economic performance of the economy better, but also to inform the design and conduct of macroeconomic policy. Appropriate policy responses to mitigate these external shocks, and deciding whether or not it is a good idea to try to insulate the domestic economy from them, depend crucially on how these disturbances affect the domestic economy. The correct identification and assessment of the sources of these external disturbances is very important in assessing output performance. This is because the strength or weakness of macroeconomic fundamentals and the impact of domestic macro and micro policies on output performance can only be properly appraised by being able to distil the effects of external factors. Failing to do so can lead to highly misleading conclusions.

The analysis of the sources and impact of external shocks on the economy also brings additional perspective to the issue of effective coordination of macroeconomic policies by the Central Bank and the Federal Government. Over the years, monetary policy in Nigeria has been accommodating fiscal policy, or more so reactionary, which is not a good practice. In as much as the economy is likely to remain sensitive to external shocks, stronger domestic fundamentals and policy frameworks would make the economy more resilient. Thus, reducing the vulnerability of the economy to such shocks would require strong efforts to achieve fiscal discipline that would bring about fiscal consolidation, efficient budgetary process, strong domestic financial system, diversification of the export structure, and reduced fiscal dependence on commodity revenues.

From the policy perspective, it is important for policymakers (the Central Bank, the Ministry of Finance and other relevant stakeholders) to determine if actions can be taken to increase the resilience of the economy to external shocks. This is because fluctuations in external fundamentals can dramatically change the path of output. Hence, building a resilient economy will help to sustain any gains from past positive performances and keep the economy on the desired growth path.

Also, for the Nigerian oil and gas sector to produce the desired economic benefits and contribute more positively to economic growth, the existing refineries should be rehabilitated and made operational to at least 80-90% capacity utilization. This is actually a least cost option compared with building Greenfield refineries of equivalent capacities. This can be achieved either through a private sector led financing and rehabilitation initiative as is currently being pursued by the NNPC, or through outright divestment of majority equity shareholding to the private sector from the current 100% ownership by Government. A deliberate policy for in-country refining capability and value creation linking the upstream and downstream sub-sectors of the economy will create additional forward and backward linkages to other sectors of the economy. A country like Nigeria can mitigate the resource curse by increasing its refining capacity, as this will improve economic and institutional outcomes of an oil-producing country like Nigeria. Increased midstream and downstream capacity would increase the availability of petroleum products, its consumption, enhance linkages to other sectors and ultimately diversify the economy.

Improving Nigeria's trade and trade relations within the ECOWAS would create a cushion during troubled times. Trade is a principal determinant of growth in Nigeria, thus, policy makers should adopt and implement policies to increase and diversify Nigeria's export, as well as investment within the ECOWAS. The ECOWAS is a huge market for Nigerian exports and a veritable outlet for investment. Therefore, Nigeria needs to adopt policies that would further promote export diversification

into light manufactures and processed natural resources to be able to take advantage of this regional market. According to AFDB (2019), as at 2017, ECOWAS total population stood at over 368 million and was projected to be 388 million in 2019. Also, ECOWAS GDP (constant 2000 US\$) stood at US\$ 222 billion in 2017 and estimated at US\$ 240 billion in 2019. This shows the potential of this regional market for Nigeria.

Several reforms aimed at improving banks corporate governance and internal systems in the Nigerian financial system have been implemented over the years. These reforms suggest that the prospects for the financial sector to perform profitably and prudently, while reducing volatility and supporting the other sectors in the system exist. However, the sustenance and possibly re-evaluation of some of these reforms to accommodate new economic developments in the country is very necessary. Thus, the financial authority in collaboration with the government need to further strengthen or re-evaluate these reforms, alongside appropriate fiscal incentives so as to create an enabling environment to attract investments into the refining sub-sector in Nigeria and other productive sectors. Consequently, those interested in going into the modular refining would then have a strong and stable financial system to support and finance their projects.

6.5 Limitations

One of the major limitations of this study was the unavailability of quarterly high-frequency data which would have been ideal and key to a study of this nature. Such data for Nigeria was not available for most of the macroeconomic variables used; hence, the study used annual data. Furthermore, the data set used for the analysis in the study could only go back as far as 1981. This is because the most recent and robust data available in the country is that which was revised up to 1981 because of the 2014 GDP rebasing. Hence, going back beyond 1981 would have resulted in the combination of data sets with different base years.

6.6 Suggestions for the future

This thesis investigated the impact of external shocks on Nigeria's output performance using selected shock variables. One interesting source of external shocks to many emerging economies during the global financial crisis was the emerging market bond index (EMBI). The EMBI which is compiled by JP Morgan relates to the market price of risky assets, and variations in the price of these assets can directly be observed through the EMBI. Initially, it was not possible to observe these variations because most lending to countries was channelled through commercial banks. The Russian crisis of 1998 has been pointed out as one of the many recent examples of sharp movements in the emerging market bond spreads. The correlation between the EMBI spreads and the U.S. Treasury bond rate stood at 0.7 at the end of 1994, but subsequently fell to -0.4 by the end of 2000 (Izquierdo et al., 2008). Izquierdo et al. (2008) noted that the sharp fluctuation of the EMBI during the Russian crisis signalled a change in how investors perceived risk in emerging markets that were highlighted by changes in U.S. T-bond rates or rates in other central economies.

This thesis could not test the impact of this variable in the study because of the lack of adequate data. Consequently, further research could examine the impact of the EMBI as a shock variable on Nigeria's output performance or on other macroeconomic variables if data is available. Also, there is a need for more intensive efforts to collect high-frequency data and to develop new methodologies to guide both empirical and theoretical studies in this area. Furthermore, further research could explore ways through which the impact of external shocks (external conditions) can be distilled from the impact of domestic economic conditions (domestic policies) for policy purposes.

Appendices:

Appendix A - A Simple Prototype RBC Model

In a simple RBC model as outlined by Stadler (1994), the economy is considered to be populated by a large number of identical price-taking firms and households, which are infinitely lived. Both agents produce a single good as output. The model abstracts from the existence of money and government, and there are no frictions or transactions costs (Stadler, 1994).

Each representative agent maximises the expected value of:

$$U_t = \sum_{j=0}^{\infty} \beta^j (c_{t+j}, 1 - l_{t+j}) \quad 0 < \beta < 1 \quad (1)$$

The function $U_t(.)$ is the instantaneous utility function of each representative agent, and $0 < \beta < 1$ is the discount factor. c_{t+j} is the consumption per member of the household, l_{t+j} is the hours worked, while $(1 - l_{t+j})$ is the amount of leisure in period t (normalized to 1 for simplicity).

To further simplify the model, it is assumed that the household's utility function is separable between c and $1 - l_t$ and U_t is log-linear in the two arguments. Thus we have:

$$U_t = \ln C_t + \theta \ln 1 - l_t \quad \theta > 0 \quad (2)$$

The production function in its simple form is given by:

$$Y_t = A_t f(K_t, L_t) \quad (3)$$

The basic inputs to production are capital (K) carried over from the previous period, labour (L), and technology (A) (a strictly positive stochastic parameter that shifts the production function, altering total factor productivity, and assumed to follow a stationary Markov process). The production function is thus defined by a conventional constant-returns-to-scale production function and an equation that gives the law of motion of the capital stock over time (Stadler, 1994). The production function can be further written as a Cobb-Douglas production function:

$$Y_t = K_t^{1-\alpha} (A_t, L_t)^\alpha \quad 0 < \alpha < 1 \quad (4)$$

The capital stock, given the law of motion of the capital stock over time, evolves in the form:

$$K_{t+1} = (1-\delta)K_t + i_t \quad (5)$$

Where δ is the depreciation rate and i_t is gross investment. It is assumed that the portion of output not consumed forms part of the capital stock in the next period.

The resource constraint faced by the agents restricts output to consumption (C), investment (I) and labour plus leisure time to the time endowment, in any time period. Thus,

$$y_t = c_t + i_t \quad (6)$$

$$h_t = n_t + l_t \quad (7)$$

Where h_t is the total endowment of time. Also, n_t can be defined as $n_t = 1 - l_t$ if h_t is normalised to unity.

Finally, the equilibrium quantities and prices can be derived by solving the agent's optimisation problem. This is possible because it is assumed that: all agents are identical, expectations are rational (agent's expectations are based on the probability distributions implied by the economy's structure), all households are alike, agents know the probability distribution generating A_t as well as the current value of A_t , and all markets clear.

In this RBC model, there is an emphasis on the intertemporal substitution of labour in the labour market. When there is an expansion in the economy as a result of technological advancement, the marginal product of labour increase, as well as employment and real wage. Here, technological advances are considered to be labour-improving, increasing labour productivity for a given level of capital. In this case, the quality of capital is better and workers using this capital are more

efficient. Employment increases as more skilled labour are needed to implement major new technologies, large numbers of people learn new skills and knowledge. This learning turns out to be the key to higher wages. Workers tend to reduce the amount of time for leisure in response to high real wages. This tends to work in the reverse when the technological shock is not desirable. The marginal product of labour, employment and real wage rate are low. Workers will tend to increase the amount of leisure time in response to the low real wage. Thus, this brings us to the procyclical nature of real wage in the RBC theory, which has a very important implication in the theory.

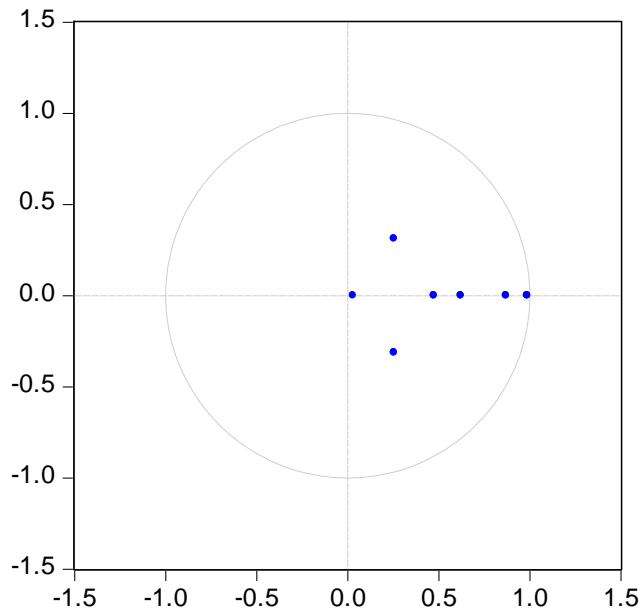
The RBC theory also takes into account how real interest rate, which is equal to the marginal product of capital behaves in response to a technological shock. When technological advancements lead to an expansion in the economy, interest rate and the marginal product of capital increases. On the other hand, interest rate and the marginal product of capital will fall in the face of an unfavourable technological shock. The real interest rate will return to its initial level in the long run, when the economy gets to the new steady state. The RBC theory notes that wages and prices adjust rapidly to clear the market because of the assumption of flexible wages and prices. There are no market imperfections as the market clears through the 'invisible hand' and leads to optimal resource allocation in the economy.

Also, the model assumes that money is neutral and does not affect real variables. Its role is only to determine the price level in the economy and is endogenous. The proponents posit that the fluctuations in money supply are caused by fluctuations in output. As output increases due to a positive technological shock, the demand for money increases, the volume of credit in the banking sector increases, the Central Bank increases the money supply, and prices increase. The role of government (fiscal policy) is limited in the RBC theory since the economy is guided by the 'invisible hand'.

Appendix B – The Inverse Roots of the AR Characteristic Polynomial

I. Graph and Table of the AR Characteristic Polynomial for Model A

Inverse Roots of AR Characteristic Polynomial



Roots of Characteristic Polynomial

Endogenous variables: LRGDP LOP TOT LCI USTB

LGEXP LM2

Exogenous variables: C GFC

Lag specification: 1 1

Date: 06/20/17 Time: 19:34

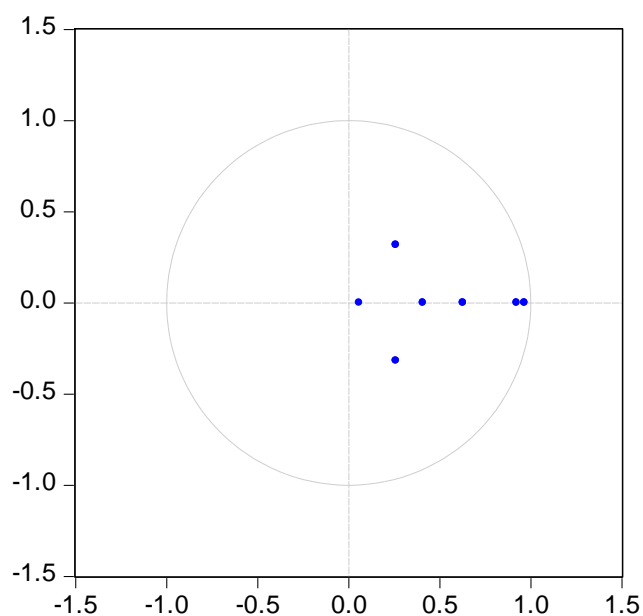
Root	Modulus
0.986572	0.9865724598076816
0.870368	0.8703680449694298
0.622514	0.6225141995901314
0.474405	0.4744050321931796
0.255029 - 0.311437i	0.4025331892500636
0.255029 + 0.311437i	0.4025331892500636
0.030229	0.0302290587623128

No root lies outside the unit circle.

VAR satisfies the stability condition.

II. Graph and Table of the AR Characteristic Polynomial for Model B

Inverse Roots of AR Characteristic Polynomial



Roots of Characteristic Polynomial

Endogenous variables: LRGDP_N LOP TOT LCI USTB

LGEXP LM2

Exogenous variables: C GFC

Lag specification: 1 1

Date: 06/20/17 Time: 21:42

Root	Modulus
0.966132	0.966132429722389
0.922607	0.9226069865921272
0.628369	0.6283685582061638
0.259728 - 0.318508i	0.4109814534191796
0.259728 + 0.318508i	0.4109814534191796
0.409133	0.4091334209134603
0.057724	0.05772441812663244

No root lies outside the unit circle.

VAR satisfies the stability condition.

Appendix C - The Derivation of the Generalized Impulse Response Function (GIRF)

The GIRF is obtained by augmenting a VAR model (transforming the VAR into infinite moving average representation) (Pesaran and Shin, 1998):

$$X_t = \sum_{i=1}^p A_i X_{t-i} + U_t \quad (1)$$

Where $X_t = (x_{1t}, x_{2t}, \dots, x_{nt})'$ is an $n \times 1$ vector of jointly determined dependent variables and $A_i, i = 1, 2, \dots, p$ is an $n \times n$ coefficient matrix. Following the standard assumptions stated above, under assumptions (1) and (2), if assumption (1) can be written as the infinite moving average representation and in assumption (2) X_t is covariance-stationary, then

$$X_t = \sum_{i=0}^{\infty} \varphi_i U_{t-i} \text{ for } t = 1, 2, \dots, T \quad (2)$$

Where the $n \times n$ coefficient matrix φ_i can be obtained using the following recursive relations:

$$\varphi_i = A_1 \varphi_{i-1} + A_2 \varphi_{i-2} + \dots + A_p \varphi_{i-p}, i = 1, 2, \dots \quad (3)$$

with $\varphi_0 = I_n$ and $\varphi_i = 0$ for $i < 0$.

Denoting the known history of the process up to time $t-1$ by the non-decreasing information set Ω_{t-1} , the GIRF of X_t at horizon n developed by Pesaran and Shin (1998), as advanced in Koop et al. (1996) is specified as follows:

$$GIRF_x(n, \delta, \Omega_{t-1}) = E(X_{t+n} | u_t = \delta, \Omega_{t-1}) - E(X_{t+n} | \Omega_{t-1}) \quad (4)$$

Where δ_j is a known vector for the VAR process with infinite moving average representation, then $GIRF_x(n, \delta_j, \Omega_{t-1}) = \varphi_n \delta_j$, which is not dependent on the history of the process (Ω_{t-1}) but rather on the composition of shocks defined by δ_j . Therefore, the appropriate choice of δ_j is central to the properties of the generalized impulse response function. Sims (1980) suggested the use of the Cholesky decomposition of shocking all the elements of ε_t to resolve the problem surrounding the choice of δ . However, the GIRF as an alternative approach shocks only one element such that $\varepsilon_{jt} = \delta_j$ based on the historically observed distribution of the errors (Pesaran and Shin, 1998).

$$GIRF_x(n, \delta_j, \Omega_{t-1}) = E(X_{t+n} | u_{jt} = \delta_j, \Omega_{t-1}) - E(X_{t+n} | \Omega_{t-1}) \quad (5)$$

Assuming normal distribution for U_t , it follows:

$$E(U_t | U_{jt} = \delta_j) = (\partial_{1j}, \partial_{2j}, \dots, \partial_{mj})' \partial_{jj}^{-1} \delta_j = \sum e_j \partial_{jj}^{-1} \delta_j \quad (6)$$

Thus, the unscaled GIRF with an $(m \times 1)$ vector of the effect of a shock in the j^{th} equation at time t on X_{t+n} is given by:

$$\left(\frac{\varphi_n \sum e_j}{\sqrt{\partial_{jj}}} \right) \left(\frac{\delta_j}{\sqrt{\partial_{jj}}} \right), n = 0, 1, 2, \dots \quad (7)$$

By setting $\delta_j = \sqrt{\partial_{jj}}$, the scaled GIRF is given by:

$$\psi_j^g(n) = \partial_{jj}^{-\frac{1}{2}} \varphi_n \sum e_j, n = 0, 1, 2, \dots \quad (8)$$

Equation (22) measures the effect of one standard deviation error shock to the j^{th} equation at time t on expected values of X at time $t + n$ (Pesaran and Shin, 1998).

Pesaran and Shin (1998) also show that the above GIRF can be used for a cointegrating VAR model (VECM). They note that when the GIRF is employed on the cointegrating relations β'_{xt} , valuable information about the speed of convergence of the system to equilibrium is contained in their time profile, as the effects of shocks die out.

$$GIRF(\beta_{jxt} N) = \frac{\beta'_j \varphi_N \sum e_i}{\sqrt{\partial_{ii}}} \quad (9)$$

Therefore, the GIRF in equation (23) gives the effect of a unit shock to the j^{th} variable on the j^{th} cointegrating relations.

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